VII. *Synopsis of the species of recent* Crocodilians *or* Emydosaurians, *chiefly founded on the specimens in the British Museum and the Royal College of Surgeons. By* Dr. John Edward Gray, *F.R.S., V.P.Z.S., F.L.S., &c.*

Read December 9th, 1862. Published 1867.

[Plates XXXI. to XXXIV.]

THE distinction of the species of Crocodiles has hitherto been one of the difficult problems in systematic zoology; and therefore I believe that it may be of some slight use to lay before the Society the result of my examination of the very large collection of Crocodiles, of all ages and from various localities, which are contained in the British Museum. Knowing the difficulty that surrounds the subject, I have made great exertions to obtain specimens from different countries; and the examination of these specimens has shown that the characters of the species, when allowance is made for the changes that take place in the growth of the animal, are quite as permanent as in any other group of Reptiles, and not more difficult to define.

An outline of the synopsis of the Crocodilidæ or Alligatoridæ was published in the 'Annals and Magazine of Natural History' for 1861 (3rd series, vol. viii.). Since that period I have examined the additional specimens which have been received in the British Museum, and also those in other collections, especially the skulls in the Museum of the Royal College of Surgeons, the specimens in the two museums at Liverpool, and in other local collections within my reach. Among the specimens recently received by the British Museum are some typical skulls from the Dutch possessions in the East, obtained from Leyden, which enable me to determine with certainty the species described by the Dutch zoologists.

The determination of the species of the Crocodilians has always been attended with considerable uncertainty; and if we may judge by the manner in which the specimens and the skulls of them are named in Museums, or sent about by the more scientific dealers, it would appear that as yet they are not properly understood.

I do not mean as to the precise limit of a species—that is to say, whether the specimens from different districts of the same zoological or geographical province are mere local varieties of the same species, or are distinct; for that is a question which I admit must, with the materials at our command, for the present remain unsolved and open to discussion. But it is not unusual to find most distinct species confused under the same name, and specimens of the same species, only different in age, separated under two or more names.

In this paper I have endeavoured to condense into a short synopsis the principal leading characters, especially those furnished by the examination of the skull and the

nuchal and dorsal plates, by which the different species of Crocodiles and Alligators may be most easily determined.

My object in this paper is to furnish the zoologist with the best character to distinguish the different species of Crocodile and Alligator, without any pretence of giving an account of the comparative anatomy or osteology of the species. I make this statement, as confusion arises in the student's mind between the object of the studies of the two branches of the science, both equally important; but the one ought to be based on the examination and comparison of the largest possible number of specimens and species, while the most important papers on comparative anatomy are often those that arise from the examination of a single example of the animal.

I am well aware that there is a prejudice against such short papers, and that they incur the reproach of certain continental and native naturalists; but after considering their objection and their practice, I am still of the opinion that papers of the kind are far more useful to the working naturalist than the long descriptions of species which it is the custom of these naturalists to prepare, when their descriptions, instead of merely presenting the peculiar character of the species under consideration, give in full detail under each species (so as to hide in a bushel of words the characters which you are looking for) the character of the genus, or even often of the family or order to which the species belongs. Macleay well observes, "The modern art of describing is too long, often insufferably long, while human life remains as short as ever" (Illust. Zool. S. Africa, p. 54).

I know by experience that synoptical papers take far more mental and bodily labour to prepare than the description of a single specimen, often taken at haphazard and regarded as the type of a species because it presents some striking peculiarities of appearance.

This paper, short as it is, is the result of the examination and repeated reexamination, at different periods, of more than two hundred specimens of Crocodiles,—a series of the most characteristic specimens of each species having been laid out so that they could be viewed and studied together and at leisure, and their peculiarities and likenesses noted down.

If all the notes made during these comparisons were printed, as is the custom with many naturalists, they would fill many pages, and thus make a long paper. Many papers and books are estimated by their size, rather than by the extent of labour that has been bestowed upon them; while the results of much labour and careful study, condensed into a few pages, are often spoken of by critics, who never undertook such researches, or who dislike the labour of condensing their observations into systematic order, as merely the short notes of a hasty examination: at least that is the way in which some papers, which were the results of equally extensive examinations, have been regarded by naturalists who should have known better.

I may further observe that, even after so much study, when new specimens have been accumulated and with additional experience, one frequently finds peculiarities overlooked

and facts requiring verification, when the old and the newly acquired specimens are submitted to a reexamination and study. It is this experience that makes me inclined to place less reliance than other naturalists upon essays prepared by persons who come and look at a series of specimens for the first time, and describe them offhand. Yet such works are often regarded as of authority, very often on account of their length, or the beautiful manner in which they are printed or illustrated.

The references to the catalogue of the osteological specimens in the College of Surgeons are based on the examination of the specimens in that collection; and I have to thank the Council of the College for their permission to examine them, and Mr. Flower, the energetic Curator of the collection, for his kindness and assistance in determining them.

If any evidence were required of the difficulties of determining the species of this family, I need only refer to the nomenclature of the skull in the catalogue above referred to, which was prepared by the late Curator of the collection, Professor Owen.

In this collection, for example, I found what I consider to be three distinct species in one case, and two distinct species in another, confounded under the same name; and on the other hand, I found what I regard as skulls of the same species inserted under three different names.

The skull of a Crocodile which is found in the internal rivers of India, is named *Crocodilus rhombifer*, Cuvier (which is an American species), though the specimen in the College Museum was received from Bengal.

I do not by any means regard my determination of these skulls as infallible; but I have taken every care to make it correct by repeated examination. I first arranged the skulls as they appeared to be alike, according to the characters here assigned to them, without paying any attention to the names given, placing them in order according as the size showed the change in the growth; and Mr. Flower, Mr. Gerrard, and some other zoologists who are used to the examination of bones, agree with me in my determination, and were much interested in observing how gradually the skulls of different ages glided into each other[1].

I must observe, if there is this difference of opinion in the determination of skulls of recent Crocodiles, where the series of skulls for different-aged animals can be compared, and where the skulls are in a perfect state, how much more difficult it must be to have confidence in the determination of the skull of the fossil, or some fossil species where the skulls are generally more or less imperfect, and perhaps only single specimens (often very imperfect specimens) have been examined!

[1] The following is the result of my examinations of the specimens of Crocodiles in the Museum of the College of Surgeons (the numbers refer to the numbers in the catalogue):—

682–707. *Gavialis gangeticus*=*Gavialis*.

710. *Crocodilus cataphractus*=*Mecistops cataphractus*, the type specimen.

711, 712, 714, 716. *Crocodilus acutus*=*Molinia americana*, from America.

The chief difficulty in distinguishing the species has originated from the very great change of forms that takes place in the shape and proportions of the head of the animal in its different stages of growth; but the changes seem nearly similar in all the species, and therefore when once observed they can be easily allowed for. The difference may be divided into three stages, exemplified in the young, the nearly full-grown, and the adult or aged specimens. The head and beak of the young are generally depressed, with more or less distinctly marked symmetrical ridge and depressions; and these characters are gradually modified until the animal assumes its nearly full size,—the skull becoming thicker and more solid, but yet retaining most of the characters that distinguish its young state. After this period, as the animal increases in age, the skull becomes more and more convex and swollen and heavy, and assumes a very different external form.

It is to be observed that in all these changes in the external form of the skull, the bones themselves of which it is composed preserve their general form and relation to each other; and the sutures between these bones appear to me to offer some of the best characters to separate the species into groups. In many instances, when I have been in doubt, the sight of the intermaxillary suture has at once solved the difficulty, which has been verified by the examination of the locality of the specimen.

These changes in the form of the head have been among the causes that have made the study of the species of Crocodiles so difficult. If this is the case with the recent species, how much more caution is requisite to determine the fossil remains of the animal! Cuvier set a very good example in that respect: he commenced the study of each group of animals with an examination of the osteology and external characters of the living species, and then applied the knowledge he thus acquired, to the distinction of the fossil remains; but now we often find palæontologists, as they call themselves, neglecting, or, at most, only taking the outline of the osteological and zoological characters of the living species at second hand, and describing the fossil, and often forming genera and species on a small fragment, thus encumbering the science with a multitude of names.

At one time I proposed to give accurate measurements of the different parts of the

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713. *Crocodilus acutus*=*Oopholis porosus* of India.
715. *Crocodilus acutus*=*Crocodilus vulgaris* of Africa.
717. *Crocodilus vulgaris*, much distorted.
718. *Crocodilus vulgaris*=*Bombifrons*, perhaps *B. siamensis*.
719–724, 727, 728. *Crocodilus biporcatus*=*Oopholis porosus*.
725. *Crocodilus biporcatus*=*Crocodilus vulgaris*.
726. *Crocodilus biporcatus*=*Bombifrons indicus*.
750, 751. *Crocodilus rhombifer*, from Bengal=*Bombifrons indicus*.
752. *Crocodilus palustris*?=*Bombifrons indicus*.
760–762. *Alligator lucius*=*Alligator mississippiensis*.
764. *Alligator niger*=*Jacare nigra*.

[1] Dr. J. E. Gray "On the Change of Form of the Heads of Crocodiles," Transactions of the Sections in 'Report of the British Association of Science,' Cambridge, 1862, p. 109.

skull of each of the specimens of the different species in the British Museum Collection; but I am satisfied that the importance of such tables of measurement is over-estimated: no doubt it has a very imposing appearance; but a good figure is more useful than any amount of measurement. Every species has its normal measurements; but these are liable to vary in the different individuals; and any difference sufficient to show a distinction of species is easily appreciated by the eye, as it must alter the general proportions of the different parts of the head.

It has been suggested that I ought to give the description of each separate bone of which the skull is composed. This may be of use to the student of comparative anatomy, but is not of so much importance to the zoologist; for though each bone has a normal form in each species of Crocodile, yet they are each liable to considerable variation within certain limits in the different individuals of the species.

The bones of the different genera have been described in several works on osteology, and they are well figured by De Blainville and others.

De Blainville, in his 'Ostéographie,' devotes five folio plates to the osteology and dentition of recent Crocodiles, giving details of *Crocodilus biporcatus*, *C. lucius*, *C. vulgaris*, *C. schlegelii*, *C. longirostris*, *C. rhombifer*, and *C. sclerops*. These plates were prepared to accompany an essay that M. de Blainville was preparing for the 'Mémoires de l'Académie des Sciences de France' when he died.

Professor Carl Bernhard Brühl, of the Universities of Cracow and Pesth, has published twenty quarto etchings of the skeletons of Crocodiles and Alligators, giving details of three or four species. The plates are exceedingly accurate, and full of details, being drawn and etched by the Professor and his wife direct from the specimens. They were published at Vienna in 1862. There is a continuation of the work, containing three additional plates, published in 1865, principally devoted to the canals of the ear-bone.

I must here refer to a paper by Professor Huxley, entitled "On the Dermal Armour of of *Jacare* and *Caiman*, with notes on the Specific and Generic Characters of recent Crocodilia," Journ. Proc. Linn. Soc. Zool. iv. p. 1. As this paper contains an excellent account of the osteological differences between the different genera of Crocodilia, I have not considered it desirable to repeat them here, more especially as they were chiefly drawn up from specimens in the British Museum.

Order EMYDOSAURI (Emydosaurians).

Emydosauri, Blainville, Gray, Ann. Phil. x. 195, 1825; Cat. Tortoises & Crocodiles Brit. Mus. 38, 1844.
Crocodilia, Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 1.

The Emydosaurians or Crocodilians may be divided into three families:—

A. *The cervical and dorsal plates forming one dorsal shield.*

I. Gavialidæ. The large front teeth and the canines in the lower jaw fit into notches in the margin of the upper jaw.

B. *The cervical shield forms a small group, which is separate from the dorsal shield.*

II. Crocodilidæ. The canines fit into notches in the upper jaw, and the large front teeth fit into pits or perforations in the front of the upper jaw.

III. Alligatoridæ. The large front teeth and the canines fit into pits or perforations in the edge of the upper jaw.

The large front teeth of the Garials fit into a notch in the front of the upper jaw, and the canines into a notch also. In the Crocodiles the canines fit into a notch, as in the Garials, but the large front teeth fit into a pit or perforation in the front of the upper jaw; and in the Alligators both the canines and the large front teeth fit into pits or perforations in the edge of the upper jaw.

The geographical distribution of the genera may be thus exhibited:—

Africa.	Asia and Australasia.	America.
	Fam. *Gavialidæ*.	
	Gavialis.	
	Tomistoma.	
	Fam. *Crocodilidæ*.	
Crocodilus.	Oopholis.	
	Bombifrons.	Palinia.
Halcrosia.		Molinia.
Mecistops.		
		Fam. *Alligatoridæ*.
		Alligator.
		Caiman.
		Jacare.

In Africa there are three species of Crocodiles. They seem all to have been known to Adanson. They are, 1. The common Crocodile (called the Olive Crocodile by Adanson), *Crocodilus vulgaris*, which is spread over the whole of Africa, from north to south and from east to west; 2. The Black Crocodile of Adanson (*Halcrosia nigra*); and, 3. The False Gavial of Adanson, the *Mecistops cataphractus*. The two latter are confined to the rivers on the west coast of Africa.

In India[1] there are also three species of Crocodiles:—1. The *Oopholis porosus* (or *Crocodilus biporcatus* of Cuvier), which is found only in the estuaries at the mouths of the large rivers; 2. The Muggar[2] (*Bombifrons indicus*); and 3. The Garial (or Ghurrial),

[1] See Dr. J. E. Gray "On the Crocodiles of India and Africa," Transactions of the Sections in 'Report of the British Association of Science,' Cambridge, 1862, p. 107.

[2] Dr. Falconer says, the proper name of the Crocodile is *Coombeer*. The Rapacious Shark is called the *Muggar*; and by reflection this name is also sometimes given to the Crocodile, because it is a rapacious animal.

which is confined to the rivers in the interior of the country. The Coombeer or Muggar ascends the rivers to the mountains, where the water is often frozen. The Ghurrial, on the contrary, is confined to the lower level, where the climate is warm.

In stating that there are three species of Crocodiles in India, I only intend to state there are three distinct forms; for I will not undertake to say for certain that the Muggar of Ceylon, of Siam, and of India are not distinct species.

Mr. Blyth observes, "Both the Gangetic species of Crocodiles have been received by the Asiatic Society, Calcutta, from Java. The Crocodiles are known to abound in Timor, from which island they may well have passed to Australia. Governor Grey met with them in the north-west."—Blyth, Rep. Austral. Vert. in Mus. A. S. C.

If by "both the Gangetic species of Crocodile" Mr. Blyth means the estuarine Crocodile (*Oopholis porosus*) and the Coombeer or Muggar (*Bombifrons indicus*), no example of the latter animals from either Java, Timor, or Australia has occurred to me, and the animal figured as *Crocodilus raninus* by Dr. Salomon Muller is certainly *Oopholis porosus*; and there is in the British Museum a fine adult skull of that species sent by the Leyden Museum from Java.

The observations of MM. Duméril and Bibron (Erp. Gén. 25, 47), that Crocodiles are not found in Australia, and that the American Crocodiles are confined to the islands of that continent, are no longer consistent with facts; indeed, long before the publication of their work, various travellers had recorded the occurrence of Crocodiles on the north coast of Australia.

The estuarine *Oopholis porosus* was observed by Governor Grey on the north-west coast of Australia. There is in the British Museum a skull of the species sent thence, and also a full-grown specimen which was killed and preserved in that country.

The Island of Borneo is inhabited by a false Garial, named *Tomistoma schlegelii*. I am not aware that it has been found in any of the other islands of the archipelago. It is intermediate in character between the true Garial and the Crocodiles.

The Crocodiles and Alligators are widely distributed in America. There are four American Crocodiles, and nine Alligators. One of the Crocodiles, *Palinia rhombifer*, is peculiar to the island of Cuba. The other species of Crocodiles and the Alligators are found on the mainland. The *Alligator mississippensis* is found far north, where the waters are often frozen; all the other Alligators and American Crocodiles are confined to the tropical and subtropical parts of the continent. *Molinia americana* is found in Cuba and St. Domingo, as well as in the rivers of the east and west side of the continent, showing the incorrectness of the assertion of MM. Duméril and Bibron that the Crocodiles of America are confined to the islands of that continent (Erp. Gén. 25, 47)[1].

[1] In the 'Gentleman's Magazine' for August 1866 appears an article, entitled "Notes on a Young Crocodile found in a Farmyard at Over Norton, Oxfordshire," by George R. Wright, F.S.A. Mr. Wright observed the specimen in a case of birds and animals, preserved by Mr. William Phillips, who said that it was found lying dead in a gutter in his farmyard, evidently but lately killed; its bowels protruded from a wound in the belly.

Family I. GAVIALIDÆ.

The cervical and dorsal plates formed into a single continuous shield. Teeth nearly of uniform size, all fitting into notches on the edge of the upper jaw. The front large teeth fitting into a notch in the front, the canines into a notch on the sides of the front of the upper jaw. The jaws elongate, slender.

Crocodilidæ (part.), Gray, Ann. Philos. x. 195, 1825.
Crocodilidæ § *, Gray, Cat. Tortoises & Crocod. B.M. 36.
Gavialidæ, Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 16, 1859.

Synopsis of Genera.

Gavialis. Beak elongate, linear, end swollen. The lateral teeth oblique, not received into pits.

Tomistoma. Beak conical, thick at the back, the lateral teeth erect, received into pits between the teeth.

1. Gavialis.

Beak of skull linear, end dilated from the enlarged nostrils. Teeth $\frac{27-27}{25-25}$, or $\frac{28-28}{26-26}$.

The mandibular symphysis extends to the twenty-third or twenty-fourth tooth. Most of the lateral teeth of both jaws are directed obliquely, and not received into interdental pits. The front margin of the orbit is much raised.

Gavial, Oppel. *Le gavial*, Cuvier.
Gavialis, Merrem, Gray, Ann. Phil. x. 195, 1825; Cat. Tortoises, &c., B. M. 36, 57, 1844. Geoff. Mém. Mus. xii. Huxley, Proc. Linn. Soc. Zool. iv. p. 20, 1859.
Gavialia, Fleming, Phil. Zool.
Ramphostoma, Wagler, Syst. Amph. 441. *Rhamphognathus*, Vogt, Zool. Brief. ii. 289.

1. Gavialis gangeticus. (The Garial or Nakoo.)

Narrow-beaked Crocodile, Edw. Phil. Trans. xlix. 639, t. 19.
Le gavial, Lacép. Q. O. 1235, t. 15. Faugas, Mont. S. P. 235, t. 8. f. 46, 47.
Lacerta gangetica, Gmelin, S. N. i. 1057. Shaw, Zool. iii. 197, t. 60.

The men said it ran out of the stack of wood, they killed it, but they could easily get him another; he offered a guinea for another specimen, dead or alive; but the reward was never claimed.

An account of the discovery appeared in the 'Field Newspaper' for 1861 or 1862; and another, with a figure of the specimen, was published in Hardwicke's 'Science Gossip,' Jan. 1, 1867, p. 7, figs. 1 & 2. Dr. Vesalius Pettigrew and Mr. Frank Buckland thought it was a very young Crocodile that had escaped from some travelling show. I should suspect that it was much more likely to be a just-hatched specimen that had been preserved in spirit and thrown away. The wound in the belly was probably the *umbilicus*. The figure shows too long and slender a beak for a young specimen of any Crocodile I have seen.

Crocodilus longirostris, Schneid. Amph. 160. Daudin, Rept. 4293. Blainv. Ostéog. Crocod. t. 2. f. 4, t. 3. f. 6, t. 4. f. C, t. 5. f. 5.

Crocodilus arctirostris, Daud. Rept. ii. 393.

Crocodilus tenuirostris, Cuvier, Ann. Mus. x. t. 1. Tiedem. Amph. t. 15. Wagler, Syst. t. 7. f. 111. Merrem, Tent. 38.

Gavialis gangeticus, Geoff. Mém. Mus. xii. Gray, Syn. Rept. 36; Cat. Tortoises &c. B. M. 57. Dum. & Bib. Erp. Gén. iii. 135, t. 26. f. 2. Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 20, 1859. Brühl, Skelet. Krokod. t. 8, 9, 10, 11, & 17.

Crocodilus gangeticus, Tied. Oppel, & Libosch., Naturg. Amph. 81, t. 14. Geoff. Mém. Mus. H. N. xii. 118.

Gavialis longirostris, Merrem, Amph. 37.

Gavialis tenuirostris, Merrem, Amph. 38. Guérin, Icon. R. Anim. t. 2. f. 3.

Ramphostoma tenuirostre, Wagler, Nat. Syst. Amph. 141, t. 8. f. 3.

Le gavial, Lacép. H. N. Q. Ovip. i. 235, t. 15.

Gavial, Owen, Monogr. Fossil Reptilia of the London Clay, t. 11. 1849 (skeleton).

Hab. Indian rivers. Bengal, Nepal, Malabar.

2. Tomistoma.

Beak of the head conical, thick at the base. Teeth $\frac{20-20}{18-18}$. The mandibular symphysis extends to the fifteenth tooth; the hinder tooth of the upper jaw, and most of those of the lower jaw received into interdental pits. Premaxillary hardly expanded, orbital margins not raised.

Gavialis, sp., Müller; Owen.

Tomistoma, S. Müller, Wiegm. Arch. 1846, i. 122.

Rhynchosuchus, Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 16, 1859.

The upper edge of the intermaxillary bone extends back as far as the second canine tooth; and in this character it differs from the skull of the slender-nose Crocodiles, as *Croc. gravesii* and *Mecistops cataphractus*.

Dr. Falconer, when describing the skull of *Crocodilus cataphractus*, in Ann. and Mag. Nat. Hist. 1866, xviii. 362, observes, "*Crocodilus schlegelii* constitutes the passage from the true Crocodiles into the Gavials," and he shows how the skull agrees with the Crocodiles' in the position of the nasal bones.

Professor Owen, in the first 'Essay on the fossil reptiles of the London Clay,' Crocodiles, p. 15, observes, "The Bornean species, *Crocodilus schlegelii*, was in fact originally described as a new species of Gavial; but the nasal bones, as in the fossil from Sheppey (figured in t. 2. f. 5), extend to the hinder border of the external nostrils." This does not agree with our skull, nor with the figures of the skull in Blainville's 'Ostéographie.' See also Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 18.

1. Tomistoma schlegelii. (Bornean Gavial.)

Crocodilus gavialis schlegelii, Müller, Naturgesch. Ost. Ind. t. 123. f. 1–5.
Crocodilus schlegelii, Blainv. Ostéog. Crocod. t. 2. f. 3; t. 5. f. 4. Brühl, Skelet. Krok. t. 8. f. 6. Owen, Fossils of the London Clay, p. 15.
Rhynchosuchus schlegelii, Huxley, Proc. Linn. Soc. iv. (1859) p. 17; Ann. & Mag. Nat. Hist. 1859.
Mecistops journei, Gray, Cat. Tortoises &c. B. M. 38, not synonyma.

Hab. Australasia, Borneo (*Müller*, *Brit. Mus.*).

The two figures of the skull in *Müller* and *Schlegel*, t. 3. f. 1 and 2, show the difference that occurs in the form of the skull of the same species.

In the British Museum there is a young specimen in spirits, and an adult skull received from the Leyden Collection, and a very fine adult skull from Borneo, obtained from Mr. Mitten.

Family II. CROCODILIDÆ.

The cervical plates forming a distinct shield, separate from the dorsal shield. Teeth strong, very unequal in size, hinder larger. The 9th upper and the 11th lower teeth larger, like canines, the large teeth of the lower fitting into pits or perforations, and the canines fitting into notches on the edge of the upper jaws. Nose of both sexes simple.

The upperside of the intermaxillary is slightly expanded behind, and its hinder end is divided, and separated into two parts by the front end of the nasal bone.

Crocodilidæ §**, Gray, Cat. Tortoises &c. B. M. 36, 1844.
Crocodilidæ, Huxley, Proc. Linn. Soc. Zool. iv. 5.
Crocodilus, Cuvier; Gray, Ann. Phil. 1825, x. 195.
Champsæ, Merrem, Tent.

Professor Huxley divides this family into two genera, *Crocodilus* and *Mecistops*. See Journ. Proc. Linn. Soc. Zool. iv. 6.

The Crocodiles when they are first hatched have a very short beak to the head. This is even the case with the long-beaked *Mecistops cataphractus*, which in its very young state is hardly to be distinguished in the form of its beak from the young of the common Crocodile, *Crocodilus vulgaris*.

As the young obtain strength the beak developes itself more or less rapidly according to the species, until its normal character is attained.

The head seems to continue of nearly the same form, merely increasing in size, for some time, perhaps years; for we know little of the duration of the life of the Crocodiles; and they are probably long-lived animals. As they reach maturity, and as old age creeps on, the skull thickens considerably, and the jaws dilate and thicken on the sides. The growth of the teeth, which are produced in succession, and greatly enlarge in diameter, and the enlargement of the jaws proceed *pari passu*: the latter is also influenced by the development of these teeth and the larger alveoli required to support them.

The head of the Crocodile first increases in length compared with its width, and then, having arrived at a certain form, increases in width, thickness, and solidity.

The same change takes place in the head and skull of the Bornean Garial, *Tomistoma schlegelii*, as is found in Müller and Schlegel's figures of the half-grown and adult skulls in their work.

It is to be observed that each of the Crocodiles of India and Africa (and it may also be the case with those of America) seems to present two varieties—one with a broad and the other with a narrower face; this variation occurring in each species appears to me to show that it is more probably a local, or perhaps even sexual variation than a specific distinction.

If it were a sexual distinction, it might be soon settled by observers in the country where they abound; but the sex of the skin and the skull sent to Europe is rarely, if ever, marked on the specimens.

The broad-nosed variety is much more abundant in the Museum than the narrow-nosed one; and this is against the form of the face being a sexual distinction, as one would suppose that they would be nearly equal in number, unless the narrow-nosed specimens are the males and they are more wary and not so frequently caught.

Some naturalists might be inclined to regard them as distinct species; but in the Museum series, large as it is, we have not sufficient materials to decide the question with any confidence. Perhaps, if the skulls of specimens from each locality could be compared, other characters might be found; but this must be left for my successors in this field of research.

In the short-nosed species the upperside of the intermaxillary bones is short, and the nasal bones are produced between their edges to the edge of the nostril; and in the genus *Halcrosia* they are produced beyond it, and form a bony septum between the nostrils. In the long and slender-nosed species the intermaxillary bones are rather produced behind and the nasal bone does not reach the edge as does the long nostril in the genus *Mecistops*; they are considerably short of them; but still the nasal bones come between the hinder ends of the intermaxillaries, and this character at once separates the skull of that genus from the two genera of Garials which have short nasal bones.

The skulls of Crocodiles may be separated thus:—

1. Nasal bone produced, and separating the nostril into two parts. *Halcrosia.*

2. Nasal bone produced, and dividing the edges of the nostril. *Oopholis*, *Crocodilus*, *Molinia* (*americana*), *Bombifrons*, *Palinia.*

3. Nasal bone not reaching the nostril. *Molinia* (*intermedia*), *Mecistops.*

The intermaxillary bone in *Bombifrons* and *Palinia* is short and truncated behind. In *Halcrosia* it is rather produced behind, the straight sides converging to a point. In all the other genera it is produced behind, with the hinder edges converging on the sides and truncated at the end.

The palatal bone in all the genera is truncated or rounded in front, except in *Mecistops*, where it is narrow, short, and acute in front.

The skulls of the genera *Bombifrons*, *Oopholis*, and *Molinia* are easily distinguished in the young state,—the face of *Oopholis* being much longer and narrower than that of *Bombifrons*, and that of *Molinia* is longer and narrower than that of *Oopholis*. The measurements following are for three skulls which appear to be from animals nearly of the state of growth, same in inches and lines:—

	Bombifrons.		*Oopholis.*		*Molinia.*	
	in.	lines.	in.	lines.	in.	lines.
Length of the skull, entire	4	8	5	8	6	9
Length of face to front of orbit	2	8	3	6	4	4
Length of forehead to front of orbit	2	0	2	1	2	4
Length of palate from condyle to front end of palatine	2	11	3	4	3	10
Length of middle suture of maxilla	1	2	1	1½	1	7
Length of middle suture of intermaxilla	0	9	1	3	1	6
Width at occiput	2	6	2	5	2	10½
Width at hinder contraction of beak	1	6	1	4	1	4½
Width at notch	0	9	0	9	0	9

The dorsal scales present considerable variations in different specimens from the same locality; but, allowing for such variations, the genera may be arranged thus:—

1. The dorsal scales nearly uniformly keeled, in four or six longitudinal series; the outer series ovate-elongate. *Oopholis.*

2. The dorsal scales nearly uniformly keeled, quadrilateral, as broad as long. *Crocodilus*, *Palinia*, *Molinia*, and *Mecistops*.

3. The dorsal scales quadrilateral, as broad as long; the vertebral series scarcely keeled, the lateral series irregular and keeled. *Halcrosia* and *Molinia*.

The eyelid of the genus *Halcrosia* is thickened with hard bony plates, as in some of the Alligators, with which it also agrees in the external form of the head and the disposition of the nuchal shield. In all the other genera it is thin and membranaceous.

Synopsis of Genera.

I. *Cervical disk rhombic, separated from the dorsal shield.* Normal Crocodiles.

A. *Nuchal scutella none. Dorsal plates ovate-elongate, in four or six longitudinal series.* Estuarine Crocodiles.

1. Oopholis. Asia and North Australia.

B. *Nuchal plates four, in a transverse series. Dorsal plates as broad as long, square.* Fluviatile Crocodiles.

a. *Intermaxillary bone truncated behind, with a nearly straight hinder edge. Face broad, oblong.*

2. Bombifrons. Toes webbed. Legs distinctly fringed. Asia.
3. Palinia. Toes short, free. Legs with only an indistinct fringe. America.

b. *Intermaxillary bone elongate, produced, and truncated behind; sutures sloping backwards and converging, then transverse or sinuous. Toes webbed. Legs fringed.*

4. Crocodilus. Face oblong, without any ridge from front of orbit, forehead flat. Africa.
5. Molinia. Face elongate, forehead convex, smooth, without any ridge from orbits. America.

II. *Cervical disk strongly keeled on each side, and nearly continuous with the dorsal shield.* Aberrant Crocodiles.

* *Face broad, nasal bone produced into the nostrils.* Alligatoroid Crocodiles.

6. Halcrosia. Africa.

** *Face very long, slender, nasal bones not reaching the nostrils.* Gavialoid Crocodiles.

7. Mecistops. Africa.

1. *The nape with a rhombic disk formed of six plates, which is well separated from the dorsal shield.* Normal Crocodiles.

A. *Nuchal scutella none. Dorsal scales in four or six longitudinal series; the outer series ovate-elongate. Toes webbed. Legs fringed. The intermaxillary bone produced, truncated, and converging on the sides.* Estuarine or brackish-water Crocodiles.

1. Oopholis.

Face oblong; orbits with an elongated, longitudinal, more or less sinuous ridge in front. Nuchal scutella none, or rudimentary. Cervical disk rhombic, of six plates. Dorsal plates uniformly keeled, in four or six longitudinal series; the vertebral series with straight internal edges, the outer ovate-elongate. Legs acutely fringed. Toes broadly webbed. Intermaxillary bone produced, and truncated behind, the sutures sloping backwards and converging, and then transverse or sinuous.

Oopholis, Gray, Cat. Tortoises & Crocodiles in B. M. 1844; Ann. & Mag. Nat. Hist. 3rd series, x. 267.

a. *The dorsal scales in six longitudinal series; the vertebral ones elongated like the others.*

1. Oopholis porosus. (The Saltwater Crocodile.)

Crocodilus porosus, Schn. Amph. 159. Gray, Cat. Tort. & Croc. &c. Brit. Mus. 58; P. Z. S. 1861, 140.
Crocodilus oopholis, Schn. Amph. ii. 165. ,
Crocodilus biporcatus, Cuvier, Oss. Foss. v. 65, t. 1. f. 4, 18, 19 (young skulls); t. 2. f. 8. Müller and Schlegel, Verh. t. 3. f. 6 (middle-aged skull). Owen, Cat. Osteol. Mus. Col. Surg. 159, nos. 719, 723, 724, 727, 728. Huxley, Journ. Proc. Linn. Soc. Zool. iv. 11. Blainv. Ostéogr. Crocod. t. 1, t. 3. f. 1, t. 4. f. , t. 52.
Crocodilus acutus, Owen, Cat. Osteol. Mus. Col. Surg. 157, no. 713.
Champse fissipes, Wagler, Amph. t. 17.
Crocodilus biporcatus raninus, Müller and Schlegel, Verh. t. 3. f. 7 (aged skull)!
Oopholis porosus, Gray, Ann. & Mag. Nat. Hist. 3rd series, x. 267, 1862.

Hab. Asia and Australia; India, Bengal, and Penang (*Hardwicke*); China (*Lindsay*); Trincomalee; Borneo (*Belcher*); Tenasserim coast (*Packman*); Siam, Cambogia (*Mouhot*).

Var. *australis*, Günther.
Crocodile, Landsborough, Explor. of Australia, i. 70.

Hab. North Australia (*Elsey & Kraig*).

Dr. Günther has pointed out to me that all the Australian specimens which we have examined have one cross band of the shield less than the Indian specimens; that is to say, they have sixteen, and the Indian specimens seventeen bands of shields from the neck to the base of the tail. That is the case both in the small specimen in spirits and the large specimen, 17½ feet long, which was procured by Mr. Kraig.

In the British Museum there is the skin of an adult from N.E. Australia, another, 13 feet long, received from the Zoological Society, and several (two-thirds half-grown) young specimens, stuffed, and several young specimens in spirits.

The largest skull in the British Museum is 29 inches long; the adult skulls vary from 29 to 31 inches in length; a half-grown species is 19 inches long. The skull 26 inches long, is said to be from an animal caught in Bengal that was 33 feet long.

Cuvier figures the skulls of young and half-grown specimens. S. Müller and Schlegel figure two skulls, one under the name of *C. biporcatus* (f. 6), and the other *C. biporcatus raninus* (f. 7): the latter seems to be from an adult or aged animal; the former (f. 6) from a full-grown one before the skull is thickened and spread out. Another specimen, figured as *C. biporcatus raninus* (f. 8), appears to be from a specimen of *Crocodilus* or *Bombifrons siamensis*. It certainly is not an *Oopholis*, from the form of the dorsal scales and the presence of the nuchal ones.

There is a good series of skulls of this species in the Museum of the College of Surgeons; but No. 725, named *C. biporcatus* in the Catalogue, is the skull of an adult *Crocodilus vulgaris*; and No. 713, called *Crocodilus acutus* in the Catalogue, is *Oopholis porosus*.

The British Museum received from the Leyden Museum an adult skull of the *Crocodilus* (*biporcatus*) *raninus* from Borneo; it is 22 inches long, and agrees in every respect with the *Oopholis porosus* from India.

Mr. Landsborough observes, "harmless as this animal is in Australia, we were not anxious for his company in his native element."—Exploration of Australia, p. 70.

b. *The dorsal scales in four series; the vertebral series broader than long, the outer series elongate-ovate.*

2. Oopholis pondicherianus. (Pondicherry Crocodile.)

Oopholis pondicherianus, Gray, Ann. & Mag. N. H. 3rd series, x. 268.
Crocodilus pondicerianus, Günther, Rept. B. I. t. 7.

The specimen of this species in the British Museum is small, and only just hatched, but it is quite distinct from all the others. The vertebral series of plates are nearly twice as broad as those in *O. porosus*; the others are also rather wider in comparison; all the dorsal scales are more keeled, and the keels on the scales on the side of the base of the tail are higher, and more prominent. The black spots are larger and further apart.

The specimen was purchased of M. Parzudaki of Paris, it having formed part of a collection which he received from the French Museum.

B. *Nuchal plates four, or rarely two or five, in a cross series. The dorsal plates as broad as long, in four or six series.* Fluviatile or River Crocodiles.

a. *The internaxillary bones truncated behind, with a nearly straight premaxillary suture. Face broad, oblong.*

To observe the form of the premaxillary suture in the preserved specimens, it is only necessary to elevate the skin of the front of the palate, and lay the bones bare.

* *Toes webbed. Legs distinctly fringed.* Asiatic Crocodiles.

2. Bombifrons.

The premaxillary suture straight, or rather convex forwards. The face oblong; forehead with nodules in front of the orbits, but no distinct preorbital ridges. Nuchal plates four, in a curved line. Cervical plates six, in the form of a rhombic shield, distinct from the dorsal one. Dorsal plates oblong, rather elongate, all keeled, in six longitudinal series, and with two short lateral series of keeled scales. The legs fringed with a series of triangular elongated scales. Toes webbed.

Bombifrons, Gray, Ann. & Mag. N. H. 3 series, x. 269.

Skull with the nostril separate, the internal nostril as broad as wide, with a deep pit on each side in front of it, and rather bent down, so as to open nearly horizontally.

1. Bombifrons indicus. (The Muggar.) (Plate XXXI., figs. 1, 2, 3.)

The intermaxillary short, nearly semicircular.

Crocodilus vulgaris, var. *indicus*, Gray, Syn. Rept. 58, 1831!
Crocodilus dubius, Geoff. Ann. du Mus. xii. 122?
Crocodilus suchus, var. D., Dum. Enc. Méth. Rept. 27.
Crocodilus palustris, Lesson, Bélanger, Voy. 305. Gray, Cat. Tort. & Croc. B. M. 62 (young). Owen, Cat. Osteol. Mus. Coll. Surg. 164 & 752! Günther, Rept. B. Ind. t. 8. f. *a*.
Crocodilus bombifrons, Gray, Cat. Tortoises & Crocodiles &c. B. M. 59, 1844 (adult)!
Crocodilus bombifrons (*palustris*?), Huxley, Proc. Linn. Soc. Zool. iv. 13! 1859.
Crocodilus biporcatus, Cautley, Asiat. Research. xix. t. 3. f. 1. p. 3! (not Cuvier).
Crocodilus trigonops, Gray, Cat. Tort. & Croc. B. M. 62, 1844 (young)!
Bombifrons trigonops, Gray, Ann. & Mag. N. H. 3rd series, x. 269!
Crocodilus vulgaris, var. B. Dumér. & Bibron, Erp. Gén. iv. 108.
Crocodilus rhombifer, Owen, Cat. Osteol. Mus. Coll. Surg. 164, n. 752! (not Cuvier).
Crocodilus ——? Owen, Cat. Osteol. Mus. Col. Surg. 159, n. 726!

Hab. India: Ganges (*Dr. Sayer*); Madras (*Jerdon*); Ceylon (*Kelaart*).

The dorsal shields in four series, all equally keeled, with two irregular series of plates on the sides. The shields are often nearly of the same form and size; but sometimes there are larger and broader shields intermixed in and deranging the series, and at other times the whole vertebral series is formed of wider shields.

This species has generally been confounded with *Oopholis biporcatus* and *Crocodilus vulgaris*.

The face of the younger specimen is rugulose and depressed, with a deep pit on the sides over the eighth and ninth teeth; there are two arched ridges on each side behind the nostril, and some rugosities in front of the orbits. In the older skull the face is very convex and rounded, rugose, with some more or less distinct rugosities in front of the orbits, but not the distinct longitudinal ridge so characteristic of *Oopholis porosus*.

Professor Owen described the peculiar form of the premaxillary in a skull in the College of Surgeons Museum, sent from Bengal by Dr. Wallich; but he refers the skull to *Crododilus rhombifer* of Cuvier, which is an American species.

The smallest specimen in the British Museum is 19 inches, and the largest nearly 10 feet long; there are skulls showing that it grows to a much larger size. The specimen I described as *C. trigonalis* is 24½ inches long.

In my Catalogue of the Tortoises and Crocodiles in the British Museum, published in 1844, I described it, from two adult skulls from India of 18 and 20 inches long, as a new species, which I called *Crocodilus bombifrons*, pointing out the straightness of the suture between the intermaxillary and the maxillary bones. I observed that I had seen in the Paris Museum a large specimen which had been described by Duméril and Bibron as an adult of *Crocodilus biporcatus*, which appeared to belong to this species, stating that it was immediately known from *C. porosus* by the breadth and convexity of the face.

In the same work I separated the Indian specimen from the common African *Crocodilus*, under the name of *Crocodilus palustris* of Lesson, and pointed out that it seemed to be the same as the *Crocodilus biporcatus raninus* of Müller and Schegel; and I described two other very young specimens under the name of *Crocodilus trigonops*, on account of the shortness and width of the head.

The examination of the specimens on which these species were founded, and the comparison of them one with another when ranged in a series, with the other specimens since obtained interlocated in their places according to their size, have convinced me that they are referable to mere variations of growth of a single species, which is generally spread over the Indian peninsula.

Var. Nose narrow, the intermaxillary bones rather longer and narrower.

Hab. Ceylon (skull, *Kelaart*).

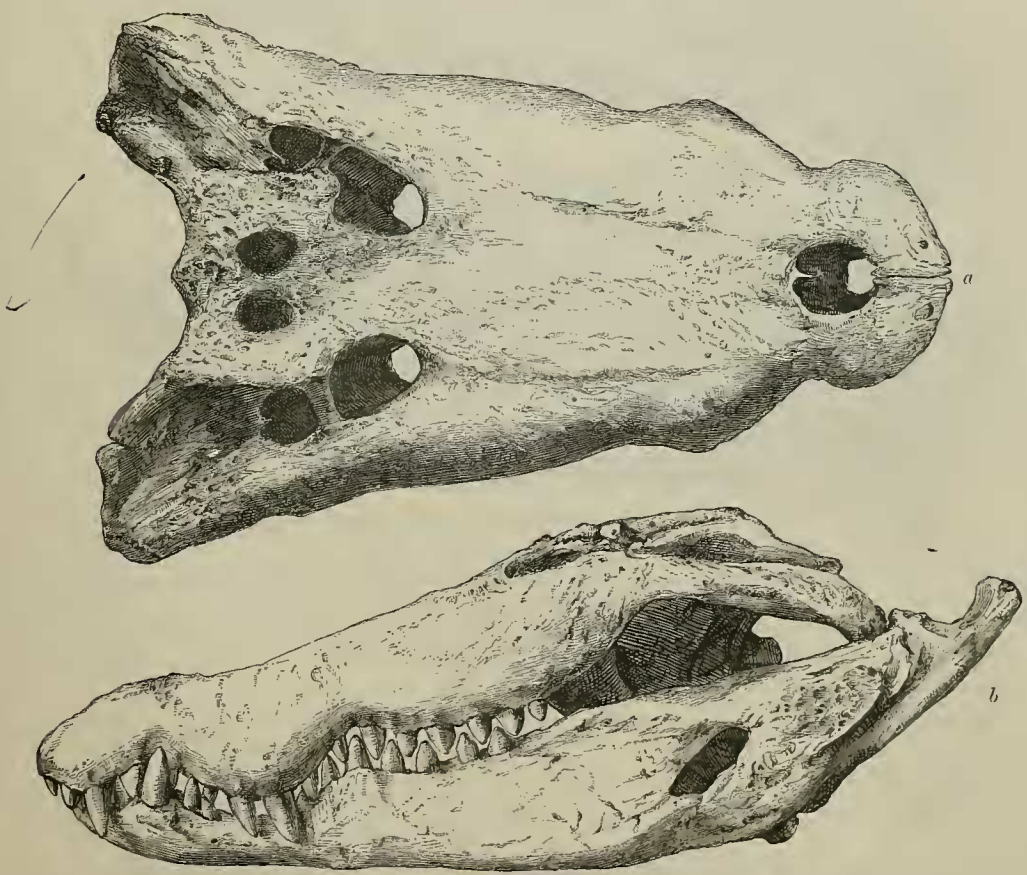


Fig. 1. and *b*. Skull of adult *C. bombifrons*, Gray, 1847. Presented by Capt. Oriel.

There may be two species of Ceylon Muggars, as in one of the heads the intermaxillaries appear to be longer and narrower than in the others from the same country. I

have not sufficient materials to satisfy myself as to the distinctness of this species and the permanence of the forms.

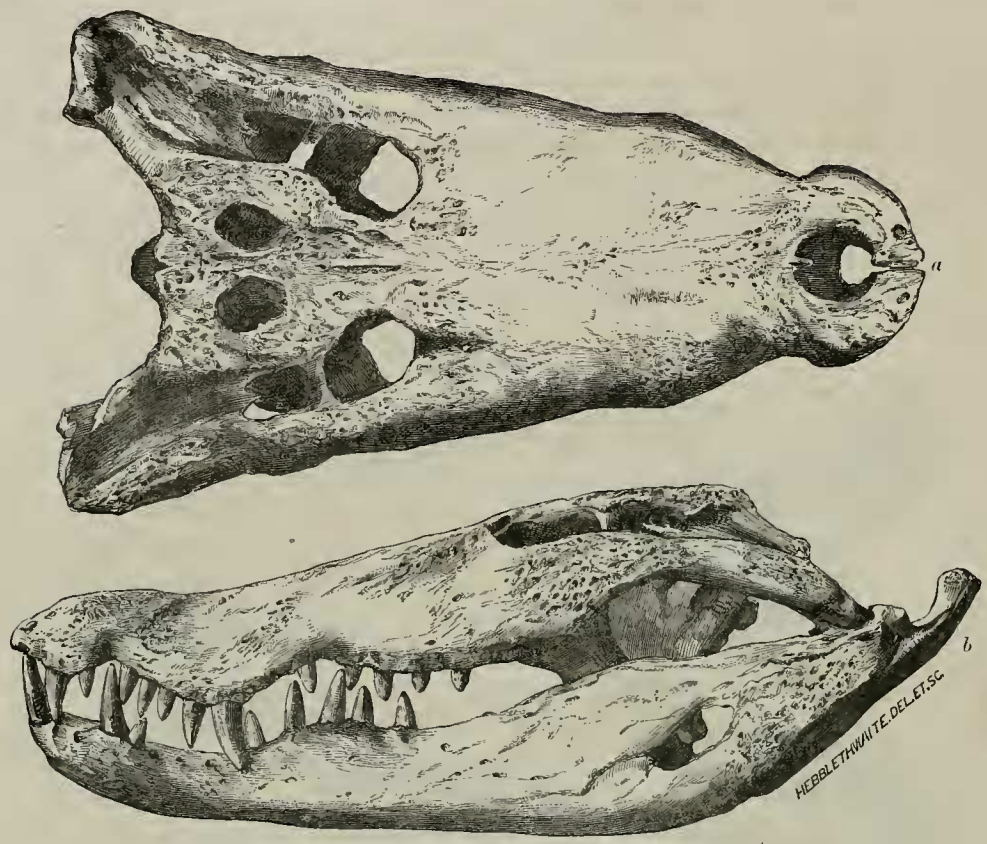


Fig. 2. Skull of *B. indicus*, nearly adult.

	Fig. 1.		Fig. 2.		Fig. 3.		Fig. 4.	
	in.	lines.	in.	lines.	in.	lines.	in.	lines.
Length of skull	20	0	17	3	9	10	4	8
Length from occiput to front of orbit	6	9	5	9	3	7	2	8
Length of face	13	3	11	6	6	3	2	0
Length of lower jaw	27	0	23	0	none.		5	5
Width at occiput	13	5	10	6	5	11	2	6
Width at hinder notch	9	2	6	9	3	9	1	6
Width at notch	5	4	5	11	2	4	0	9

The face becomes shorter, compared with the width of the middle of the face, as the animal becomes older.

In the young, fig. 4, the length of the head is rather more than three times the width of the swollen part behind the notch. In fig. 3 it is just three times, and in fig. 2 it is

twice and a half the length of the width at the same part; and in the old skull, fig. 1, it is only a little more than twice the width of the face in length.

Fig. 3. Skull of *B. indicus*, half-grown. India, Sir John Boileau.

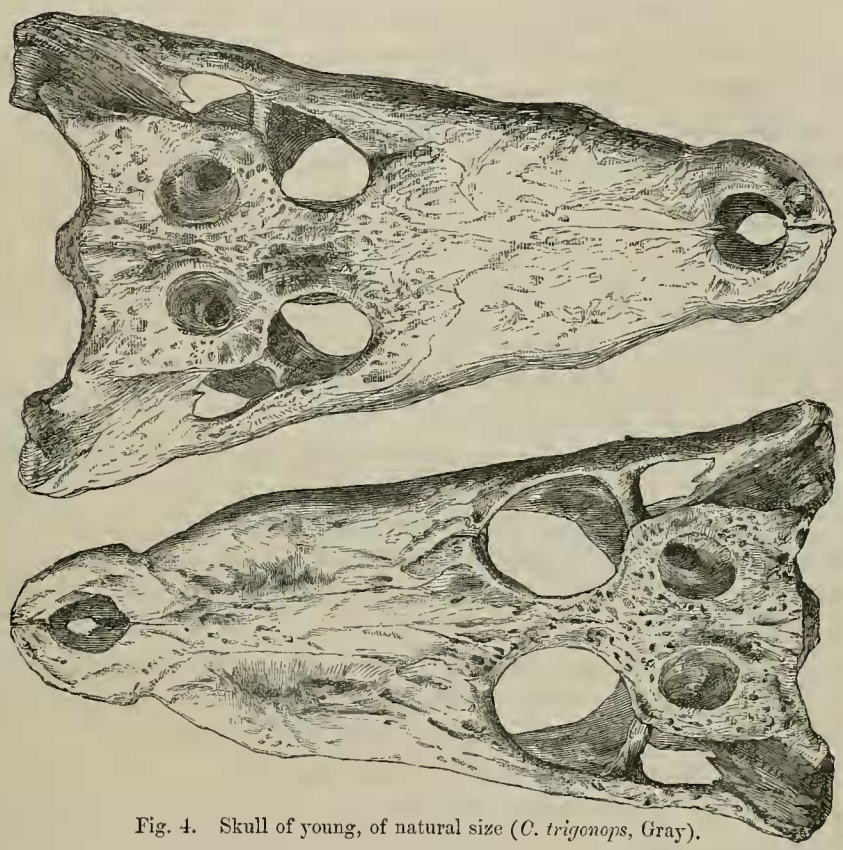


Fig. 4. Skull of young, of natural size (*C. trigonops*, Gray).

As a good illustration of the difference in the appearance of the skulls of the individuals of the species, I may give the measurement of two skulls of "Muggars" from India, of the same size, in the British Museum Collection:—

	Broad variety.	Narrow variety.
	inches.	inches.
Length of the skull along the forehead	$9\frac{7}{8}$	$9\frac{7}{8}$
Length of side of the skull	$10\frac{7}{8}$	$10\frac{7}{8}$
Width of back of skull	$5\frac{7}{8}$	$5\frac{1}{2}$
Width in front of orbits	$4\frac{1}{4}$	4
Width over largest tooth	$3\frac{3}{4}$	$3\frac{1}{4}$
Width at notch	$2\frac{1}{2}$	2 or $1\frac{15}{16}$

The broad-nose variety (fig. 3) was presented by Sir John Boileau, and the narrow one by Capt. Boys.

x 2

When the two skulls are placed side by side, the large teeth are just the same distance apart, and the different teeth in the two skulls exactly agree in size, position and distance from each other.

2. Bombifrons siamensis. (Siamese Muggar.)

The face depressed, elongate, nearly smooth, with a slight nodule in front of the orbits. Intermaxillaries rather elongate, half oblong.

Crocodilus niloticus, Latr. Rept. i. 206, t. —. From Faujas St. Fond, Mont. St. Pierre, t. 43.

Crocodilus siamensis, Schn. Amph. 157. Gray, Syn. 60; Cat. Tort. & Croc. B. M. 63 (monstrosity) ? From Perrault, Hist. Acad. Sci. iii. 255, t. 54. Günther, Rept. B. I. t. 18. f. 3.

Crocodilus galeatus, Cuvier, Oss. Foss. v. 52, t. 1. f. 9 (from Perrault). Dum. & Bibr. Erp. Gén. iii. 113.

Crocodilus palustris (part.), Dum. & Bibr. Erp. Gén. iii. 113.

Crocodilus vulgaris (part.), Gray, Syn. 58. Dum. & Bibr. Erp. Gén. ii. 108 ? Müller & Schlegel, Verh. t. 3. f. 9 (head?).

Crocodilus vulgaris, Owen, Cat. Osteol. Mus. Col. Surg. 107. n. 718 ?

Bombifrons siamensis, Gray, Ann. & Mag. N. H. 3rd series, x. 269.

Hab. Siam, Cambogia (*M. Mouhot*).

There is a well-preserved half-grown specimen of this species in the British Museum. It differs from all the specimens of *Bombifrons indicus* in the collection in the face being much longer, and not so tubercular and pitted.

It has four series of nearly equal-sized, uniformly shaped, and keeled shields, with three interrupted series of unequal-sized smaller shields on each of the sides; those of the outer series are the longest.

As the head agrees with the figure of the head from which Schneider named his species, I have retained it; and I have little doubt that the two keels which are present in that specimen are either an individual peculiarity, or perhaps a character that developed itself as the animal approached old age.

The skull of the young animal in the Museum of the College of Surgeons, no. 718, appears to belong to this species; but it requires more comparison. It is clearly a *Bombifrons*, and it is much smoother and longer than the skull of *B. indicus* of the same size and age. Professor Owen observes, "The palatine suture between the premaxillary and maxillary bones passes obliquely backwards a little way at its commencement, and then extends truncated across; but the premaxillary bones are larger than in the second Gangetic Crocodile." There is a small palpebrary ossicle above the anterior angle of the eyes.—Owen, *l. c.* p. 157. n. 718.

There is a young specimen of a Crocodile, received from Singapore, which somewhat resembles the one from Siam in the form of the head, and has six series of strongly keeled shields on the back; but the four middle ones, of nearly equal size and form, and those of the outer series, are narrower, and there is a series of much smaller ones below on each of the sides. I am by no means convinced that this will form a distinct species, it is probably only an accidental or a local variety.

** *The legs with an indented fringe of short, narrow scales. Toes short, nearly free.* American Crocodiles.

3. Palinia.

The face oblong; forehead very convex, with a ridge in front of each orbit, converging in front and forming a lozenge-shaped space. Nuchal plates two or four, unequal. Cervical disk rhombic, of six large plates. Dorsal plates large, broad, in six series; the vertebral series nearly smooth, the lateral one strongly keeled. The intermaxillary short, truncated behind the premaxillary; suture straight, transverse.—See Cuvier, Oss. Foss. iii. 72, t. 3. f. 1–5.

Palinia, Gray, Cat. Tortoises & Crocodiles, B. M. 1844; Ann. & Mag. Nat. Hist. 3rd series, x. 270.

1. Palinia rhombifera. (Cuban Palinia.)

The upper surface of the forearms and thighs covered with convex keeled scales; the outer edge of the legs and feet with a series of very elongate scarcely raised scales, forming only a slight fringe. The toes short, scarcely webbed.

Aquez palin, Hernand. Nov. Mexic. ii. 2.

Crocodilus rhombifer, Cuvier, Ann. Mus. H. N. x. 51; Oss. Foss. v. 51, t. 3. f. 1–4. Tiedem., Oppel, & Lebosch, Nat. Amph. 75, t. 10. Gray, Syn. Rept. 59. Dum. & Bibr. Erp. Gén. iii. 97. Sagra, Cuba, t. 4! Huxley, Proc. Linn. Soc. iv. 10. Blainv. Ostéog. Croc. t. 5. f. 3 (head?) (not *Owen*).

Crocodilus (Palinia) rhombifer, Gray, Cat. Tort. Croc. B. M. 63; Ann. & Mag. Nat. Hist. x. 270.

Crocodilus planirostris, Graves, Ann. Gén. des Sci. Phys. de Bordeaux, ii. 348. Gray, Syn. Rept. 59.

Crocodilus gravesii, Bory de St. Vincent, Dict. Class. H. N. iii. 109, t. Dum. & Bibr. Erp. Gén. iii. 101.

Hab. South America, Cuba (*W. S. Macleay, Ramon de la Sagra*).

In the British Museum there is a well-grown specimen, 5 feet 4 inches long, of this species, collected in Cuba by M. Ramon de la Sagra, and sent from the French Museum. Two young specimens in spirits, sent from Cuba by Mr. W. S. Macleay, are almost 2 feet long, are pale brown, with small dots on the head, and a dark spot on the middle of many of the dorsal scutella; the face is irregularly tessellated with square brown spots.

Cuvier described the *Crocodilus rhombifer* from two specimens:—one in the Cabinet of the Academy of Sciences, in a nearly entire state; and the other, a very mutilated skin, in the Museum, which also furnished him with the skull figured in t. 3. f. 1, 2, 3, 4, 5 of his work on Fossil Bones, pp. 51–70. The original habitats of these specimens were not marked. But M. Ramon de la Sagra sent a young living specimen to the Jardin des Plantes, proving that this is an American species; and it is probable that the Crocodile which Hernandez describes and figures as coming from New Spain, under the name of *Aquez palin*, belongs to this species.

M. Graves, in the 'Annales Générales des Sciences Physiques de Bordeaux,' describes a Crocodile under the name of *C. planirostris*, from a specimen which was formerly in the Collection of the Academy of Bordeaux, but is now in the Museum of that town. It was procured from M. Journée, a surgeon of a ship that for some time traded with the negroes of the coast of Congo. M. Bory de St. Vincent for these reasons thought it might

have come from Africa; and he figured and described it under the name of *Crocodilus gravesii* in the Dictionnaire Classique d'Hist. Nat. vol. iii. p. 109, t.

MM. Duméril and Bibron observe that, when they asked for a new account of the specimen, it was in such a bad condition that they could only reproduce the description given by M. Graves. The study of the description and figure, which are the only material now left for the purpose, lead to the idea that it was not distinct from *Crocodilus rhombifer*, and was most probably brought from the island of Cuba; and the ships which are engaged in trade with the negroes on the coast of Congo frequently visit Cuba, as that island is furnished with slaves from the Congo coast; so that it is not at all unlikely that the specimen was brought from that island.

2. Palinia? moreletii. (Yucatan Palinia.)

Crocodilus moreletii, Dum. Arch. du Mus. vi. 255, t. 20; Cat. Rept. 28, n. 5*.
Palinia? moreletii, Gray, Ann. & Mag. N. H. 3rd series, x. 271.

Dorsal scales keeled, nearly square; scales of the sides and limbs smooth, without tubercles.

Hab. Yucatan, Lac Flores (*M. Morelet*).

This species is described from a specimen in the Museum of Paris, which is very badly figured and indistinctly described in the memoir above cited.

There are two young specimens of Crocodiles, in spirit, without habitats, in the British Museum, which are peculiar in the large size of the nuchal shield, the strength of the keels of the dorsal shields, and the large keeled scales of the forearms and thighs, in which they agree with *Palinia rhombifera*; but there is so much difference between the two, and between each of them and the specimens of that species from Cuba, that I think they must be left in doubt for further elucidation. There are also two small stuffed specimens in the collection (purchased of dealers, without any locality attached), which are peculiar in having six series of uniform, squarish, very strongly keeled dorsal scales; they are very unlike any other specimen in the collection, and may be new; but I do not like to describe them in the present imperfect state of our knowledge.

b. *The intermaxillary bone elongate, produced and truncated behind; the sutures sloping backwards and converging, and then transverse or sinuous. Toes webbed. Legs with a fringe of elongated triangular scales.*

4. Crocodilus.

Face oblong, depressed, without any ridge in front of the orbits. Nuchal shields four, in an arched series. Cervical disk rhombic, of six shields. Dorsal plates quadrilateral, as broad as long; the vertebral series rather the widest and most keeled. Intermaxillary produced behind.

Crocodilus, Gray, Ann. & Mag. N. H. 3rd series, x. 271.

"The crocodiles live on the mud-banks or swimming about the rivers" of Africa.

Dr. Balfour Baikie observes:—"The ninth upper tooth of crocodiles is said to be

enlarged like a canine; but this is not correct. I have examined the dentition of eighteen skulls of various species; in the lower jaw there are always nineteen teeth, but in the upper jaw the number in the adult is seventeen on either side, while in the young it is eighteen. This is owing to the second incisor being deciduous; and in old skulls the socket is completely obliterated by the enlargement of foramen for the two anterior teeth. Thus in old animals there are only four teeth in each intermaxillary bone, while in the younger individuals there are always five. So, more strictly, it is the tenth, and not the ninth, upper tooth which is enlarged."—*P. Z. S.* 1857, p. 50.

CROCODILUS VULGARIS. (Olive African Crocodile.)

Crocodilus niloticus (part.), Daud. Rept. ii. 267. Wagler, Syst. Amph. t. 7. f. 11. 1, 2.
Crocodilus vulgaris, Cuvier, Oss. Foss. v. 42, t. 1. f. 5 & 12, t. 2. f. 7. Blainv. Ostéogr. Crocod. 126. Gray, Ann. & Mag. N. H. 3rd series, x. 271. Huxley, Proc. Linn. Soc. iv. 6.
C. suchus, Geoff. Ann. Mus. x. 84, t. 3. f. 2–4.
C. chamses, Bory, Dict. Class. H. N. v. 105.
C. lacunosus, Geoff. Croc. d'Egypte, 167.
C. marginatus, Geoff. Desc. d'Egypte, 365. Gray, Cat. Tortois. 61.
Crocodilus cataphractus, Rüppell, MS. Gray, Syn. Rept. 78. Mus. Frankfort.
Crocodilus verd de Sénégal, Adanson, Sénég. Cuvier Oss. Foss. v. 4.
Crocodilus acutus, Owen, Cat. Osteol. Mus. Coll. Surg. p. 157. n. 715, not Cuvier.
Crocodilus binuensis, Balfour Baikie, Proc. Zool. Soc. 1857, xxv. 484. Skull described.
Green crocodile, Gray, Rep. of Brit. Assoc. 1862, Sections, p. 107.

Hab. African rivers. Living on the mud-banks: North Africa, Egypt; West Africa, Senegal (*Adanson*); Gaboon (*Murray*, *Cope*); South Africa, Cape of Good Hope; Central Africa, Kwora and Binui (*Baikie*); Madagascar (*Havet*, fide *Cuvier*, Oss. Foss. 44).

Fig. 5.

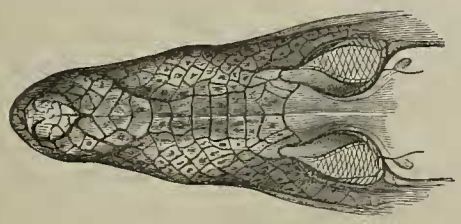


Fig. 7.

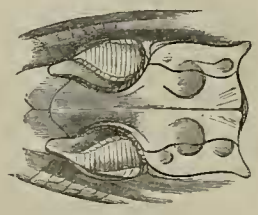


Fig. 6.

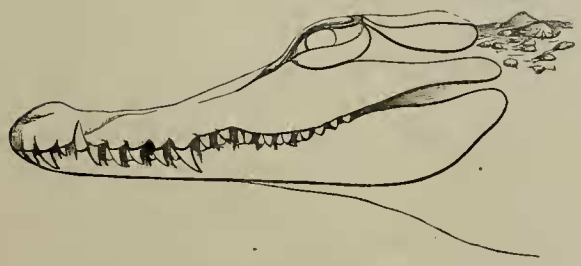


Fig. 8.

Figs. 5, 6, 7, 8. Head and nuchal and cervical shields of *Crocodilus vulgaris*.

The largest specimen in the British Museum is nearly 15 feet long. There is a very fine skull received from old Calabar, whose greatest width behind is 13 inches, length above upper surface from end of nose to back of occiput 22 inches, width at the larger lateral tooth $7\frac{3}{4}$ inches, at the notch $4\frac{3}{4}$ inches. The intermaxillary bones are produced backwards between the ends of the maxilla. The hinder nasal opening is transverse, inferior, and ascending nearly perpendicularly. The nose has two large oblong diverging prominences on the sides—one over the hinder edge of the notch, and the other over the hinder part of the root of the largest tooth, behind the notch.

There is a second skull from Western Africa in the Museum, of nearly the same length, which is considerably narrower in all its parts. Length along the upper surface from end of nose to back edge of occiput $20\frac{1}{2}$ inches; greatest width behind, 12 inches, at largest lateral tooth $6\frac{1}{2}$ inches, at the notch $3\frac{3}{4}$ inches.

These two skulls rather differ in the direction of the suture behind the maxillary bones; in the wider specimen it is much more produced behind than in the other.

I have examined and compared with care specimens of different ages from North Africa near the Nile, from West Africa at Senegal and Gaboon, South Africa at the Cape of Good Hope and Natal, and a specimen brought from Central Africa by Dr. Baikie; and though they each exhibited certain peculiarities, yet I believe, as far as the specimens at my command enable me to form a judgment, that they all belong to a single species which is generally distributed over the African continent.

At the same time, from the slight differences which the specimens from the different localities do exhibit, I should not be surprised, if we had a complete series of perfect specimens and of skulls of different ages from each locality, to find that there were sufficient differences between them to show that each locality has a special local variety or, perhaps, species; but unfortunately there is not in the British Museum, or in the other museums and collections to which I have access, such a series; all the specimens from the cape of Good Hope and West Africa seem to be either in the adult or very young state, while those from the other localities are either very young, or of an intermediate age.

On the other hand the series of specimens from the same locality, as from South Africa for example, whence we have most specimens, exhibit variations among themselves, quite as great as between the specimens from various parts of Africa.

It is therefore more safe to regard them all as one species.

These species grow to a large size; we have a specimen from the Nile and some from the Cape of Good Hope in the British Museum which are nearly 15 feet long.

The skulls which seem to belong to larger specimens often reach the length of 24 or 25 inches.

The history of the Nile Crocodile is given in great detail in the fifth volume of Cuvier's 'Recherches sur les Ossemens Fossiles,' v. 43.

Geoffroy St. Hilaire, in his 'Essay on the Crocodiles of Egypt,' separated the Egyptian

specimens into two species under the name of *Crocodilus lacunosus* and *C. marginatus*. In the "Annales du Muséum," vol. x. p. 83, he described a third, under the name of *C. suchus*.

Professor Owen has figured the skull of a crocodile, from an Egyptian mummy, under the name of *Crocodilus suchus*, Geoff., in the 'Monograph on the Fossil Reptilia of the London Clay,' published by the Palæontographical Society, 1850, t. 1. f. 2. I do not see how it differs from the crocodiles at present found in the Nile. See also Huxley, Journ. Proc. Linn. Soc. iv. 15.

In the 'Catalogue of Tortoises and Crocodiles,' p. 61, I separated the adult Cape crocodiles from the North-African specimens, under the name of *C. marginatus*, because the head is not so narrow; but it is to be observed that most of the North-African specimens with which I had compared them were of small size, and consequently had the head less developed.

Dr. Baikie described the crocodile of Central Africa, found in the river Kwora and Binue (or Niger and Twedda), under the name of *Crocodilus binuensis*; it is of a dark green colour, and lives on the mud-banks or swimming in the rivers.

Mr. Cope, 'Proceedings of the Academy of Natural Sciences of Philadelphia' for 1859, p. 296, regards the crocodile of Equatorial Western Africa (Ogobai) as the *Crocodilus marginatus* of Geoffroy.

Dr. A. Smith, referring the Cape specimens to *Crocodilus marginatus*, observes, "they are occasionally found in the rivers west of Port Natal, but more abundantly in those to the eastward and northward, and occur in such numbers in the rivers in a district north of Kurrichane, between 24° and 22° south latitude, that the natives who used to reside there were known by the appellation *Baquana*=the people of the crocodile."—*Zool. South Africa*, Appendix 2, 1845.

MM. Duméril and Bibron in their 'Erpétologie Générale,' iv. 104, divided their *Crocodilus vulgaris* into four varieties, thus:—

Var. *a*. The *Crocodilus vulgaris* of Geoffroy, from North Africa, Egypt, and the Nile.

Var. *b*. *Crocodilus palustris*, Lesson, described from a specimen sent from the Ganges by M. Duvaucel, and from the coast of Malabar by M. Dussumier.

Var. *c*. the *Crocodilus marginatus*, I. Geoffroy, from North Egypt and the Cape of Good Hope.

Var. *d*. the *Crocodile verd* of Adanson, from the Nile, the Niger, and Senegal.

There is no doubt that vars. *a*, *c*, and *d* are true Crocodiles, and are what is considered in this essay to be the *Crocodilus vulgaris* of Africa.

Var. *b* on the other hand does not belong to the same genus. I have not the slightest doubt this variety is founded on young and half-grown specimens of *Bombifrons indicus*, most distinct from *Crocodilus vulgaris* by the form of the head and the structure of the skull, as MM. Duméril and Bibron would have found, if they had examined any of

the twelve specimens which they say they procured. They have named the adult specimen in the Paris Museum *Crocodilus biporcatus*.

In the 'Annals and Magazine of Natural History,' vol. xviii. t. 7, Dr. Falconer figures the skull of a Crocodile under the name of *C. marginatus*, which is in the Belfast Museum. It is said to have been brought from Sierra Leone; but I think that this must be a mistake: it is not like the skull of any Crocodile I have seen from West Africa, and it is not a bad representation of the skull of a half-grown *Bombifrons indicus* from India. Can the habitat be a mistake? perhaps the habitat was only intended for the first-described species, *Cataphractus mecistops*, for which it is the true locality.

A skull of *Crocodilus vulgaris* is described in Professor Owen's 'Catalogue of Osteological Specimens in the Museum of the College of Surgeons' under the name of *Crocodilus acutus*, p. 157. n. 715.

5. Molinia.

Face elongate; forehead swollen, convex, especially in the adult; orbits without any anterior ridge. Nuchal plates two or four, small. Cervical disk rhombic, of six plates, the side plates generally small. The legs fringed with a series of triangular elongate scales. Toes webbed. Scales of the forearm and thigh thin, smooth.

Muzzle oblong, elongate, slender, with a swollen convexity on the middle of the face before the eyes. Nostril not separated by a long ridge: the internal nostril posterior, with an oblong sloping opening; the intermaxillary suture produced behind between the ends of the maxillæ.

Molinia, Gray, Ann. & Mag. N. H. 3rd series, x. 272.

* *Face slender. Dorsal plates irregular; the central series small, keeled; lateral scattered, strongly keeled. Nasal bones produced to the nostrils.* Molinia.

1. Molinia americana (American Crocodile).

Crocodilus americanus (*Plumieri*), Sehn. Amph. ii. 23. Gray, Cat. Tort. & Croc. &c. B. M. 60.

Crocodilus acutus, Geoff. Ann. Mus. ii. 53, t. 57. f. 1. Cuvier, Oss. Foss. v. t. 1. f. 3 & 14, t. 2. f. 5. Gray, Syn. 60. Dum. & Bib. Erp. Géu. iii. 120. Owen, Cat. Osteol. Spec. Mus. Col. Surg. 157. n. 711, 712, 714, 716; Reptiles of the London Clay, t. 25. f. 10. Brühl, Skelet. Krokod. t. 8 & 9, t. 10, t. 17.

Crocodilus americanus (*acutus*, Cuv.), Huxley, Journ. Proc. Linn. Soc. iv. 11, 1859.

Molinia americana, Gray, Ann. & Mag. N. H. 3 ser. x. 272.

?? *Crocodilus biscutatus* (part.), Cuvier, Oss. Foss. x. t. 2. f. 6. Tiedem. Amph. t. 12.

Crocodilus de St. Domingue, Geoff. Ann. du Mus. ii. 53, t. 27. f. 1.

Hab. Tropical America. Cuba (*W. S. Macleay*); Jamaica (*B.M.*); West Ecuador Nicaragua (*Fraser; Richardson*); West coast of America (*Belcher*); St Domingo (*Cuvier*); Guatemala (*Salvin*).

The specimens in the British Museum vary in length from 19 to 103 inches; and the skulls show that they grow to a larger size.

Var. with two additional small cervical scutella behind the others. B.M.

Crocodilus americanus, var.? Gray, Cat. Tort. & Croc. B. M. 60.
Crocodilus acutus, var., A. Dum. Cat. Rept. 28; Arch. du Mus. vi. 256.
Molinia americana, var., Gray, Ann. & Mag. N. H. x. 272.

Hab. West coast of America (*Belcher*); Mexico (*Warwick*).

Cuvier in his essay gives the history of this species under the name of Le Crocodile à museau effilé, ou de Saint Domingue (*Crocodilus acutus*, nob.), Oss. Foss. v. 458, and figures the skull at t. 1. f. 3 & 14, and the nuchal shield at t. 2. f. 5.

Professor Brühl described and figured the skeleton of this species in his work. There is the skeleton of a well-grown specimen in the British Museum, and several skulls. The central prominence of the hinder part of the muzzle is sometimes much less developed than in the typical skulls.

** *Face very slender. Dorsal plates nearly uniform. Nasal bones not produced quite to the nostrils.* Temsacus.

2. Molinia intermedia (Orinoco Crocodile). (Plate XXXII. figs. 4–6.)

Dorsal plates in six rows, all slightly and nearly equally elevated; the keels of the two vertebral series rather larger than the others, quadrilateral, rather broader than long; the lateral ones oval, with five or six large plates forming an interrupted line on the sides.

Crocodilus intermedius, Graves, Ann. Sci. Phys. ii. 344. Gray, Syn. 59.
Crocodilus journei, Bory, Dict. d'H. N. v. iii. Dum. & Bib. Erp. Gén. iii. 129. A. Dum. Arch. du Mus. x. 172, t. 14. f. 3 (head). Huxley, Proc. Linn. Soc. iv. 11.
Crocodile de l'Orénoque, Parzudaki, MS.
Mecistops journei (part.), Gray, Cat. Tort. & Croc. B. M. 58, from Bory.
Molinia intermedia, Gray, Ann. & Mag. N. H. 3rd series, x. 272.
?? *Mecistops bathyrhynchus*, Cope, Proc. Acad. N. S. Philad. 1860, xii. 550 (skull).

Hab. America: Orinoco.

There is a young specimen in spirits in the British Museum, sent by M. Brandt, of Hamburg, as *Crocodilus acutus*, and an adult skull, 20 inches long, received from Paris as *Crocodile de l'Orénoque*, and a second very large skull purchased in London.

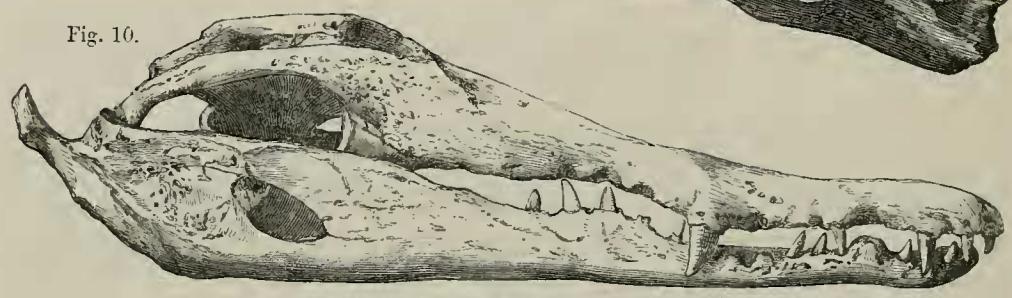
In my Catalogue of Tortoises and Crocodiles in the British Museum Collection, from all I could then learn, I was induced to believe that the *Crocodilus intermedius* of Graves was the same as the *Crocodilus schlegelii* of Borneo, and therefore called the Bornean animal *Mecistops journei*. M. Duméril, in his paper in the Archives du Muséum, not seeing the mistake, says that I refer the true *Crocodilus intermedius* to the genus *Mecistops*, and suggests that *Crocodilus acutus* ought also to belong to it.

M. Auguste Duméril, for the purpose of comparing the head of this Crocodile with that of *Crocodilus leptorhynchus* of West Africa, gave a figure of the head and front part of the back of the *Crocodile de Journée*, Archiv. du Mus. x. 173, t. 14. f. 3; but it does not appear whether it is from a specimen, or only an enlarged copy of the figure of

M. Bory de St. Vincent. If the latter, it is so embellished that one is unable to recognize its origin.

Fig. 9.

Fig. 10.



Figs. 9 & 10. Skull of *Molinia intermedia*: adult.

II. *Nape with a broad flat-topped shield formed of two or three pairs of keeled plates, strongly keeled on each side, and nearly continuous with the dorsal shield. Legs fringed. Toes webbed.* Abnormal Crocodiles.

* *Face broad; nasal bone produced into the nostril.* Alligatorian Crocodiles.

6. Halcrosia.

The premaxillary suture transverse, rather convex backwards. Nasal bones produced beyond the intermaxillary, and forming a bony septum between the nostrils. The palatine bone produced to the same level as the lateral opening—that is, to the lateral inflection of the skull. The face oblong, broad, without any ridge in front of the orbit. Eyelids with two bony plates. Nuchal plates four, in a cross row, strongly keeled. Cervical plates three or four pairs, forming a ridge on each side, the hinder one smaller. Dorsal plates in four series; the central broad, slightly keeled, the outer narrow, distinctly keeled; sides with large convex scales.

Halcrosia, Gray, Ann. & Mag. N. H. 3rd series, x. 273.

Osteolæmus, Cope, Proc. Acad. N. S. Philad. xii. 550.

It has the square head and the elongated cervical shield formed of single pairs of scutella, and the bony eyelids, of the Alligators with bony eyelids; but it is a Crocodile, and there are two bones in the eyelid instead of one as in *Caiman palpebrosus*.

The skull of the *Alligator palpebrosus* is easily known from that of this species even in the young by the cheeks of the former being flattened and nearly erect, and of the latter spread out, and in the supratemporal fossæ being open, while in the Alligator they are closed even in the young specimens.

Most probably it was from the examination of a skull of this Crocodile that the statement has arisen that in some Alligators the canine teeth sometimes fit into a notch in the upper jaw, and not into a pit as they normally do in that genus. I will not undertake to say that such an abnormal state does not exist in the genus *Alligator*; but I have not observed it.

HALCROSIA NIGRA (Black African Crocodile). (Plate XXXI. figs. 4, 5, 6.)

Krokodile noir du Niger, Adanson, MS., Mus. Paris. See Cuvier, Oss. Foss. iii. 41.
Crocodilus niger, Latr. H. N. Rept. i. 510, from Adanson.
Crocodilus palpebrosus, var. 2, Cuvier, Oss. Foss. iii. 41, t. 2. f. 6 (part.).
Crocodilus trigonatus (part.), Cuvier, Oss. Foss. iii. 65.
African Black Crocodile, Gray, Rep. Brit. Assoc. 1862, Sections, 107.
Osteolæmus tetraspes, Cope, Proc. Acad. N. S. Philad. xii. 550.
Crocodilus frontatus, A. Murray, Proc. Zool. Soc. 1862, pp. 139, 213, fig. head, t. 29. by Ford. Strauch, Syn. Croc. t. 1 (head, young).
Halcrosia frontata, Gray, Ann. & Mag. Nat. Hist. 3rd series, x. 277.

Hab. West Africa: Senegal (*Adanson*); Gaboon; Old Calabar; Ogobai River (*Cope*).

Fig. 11.

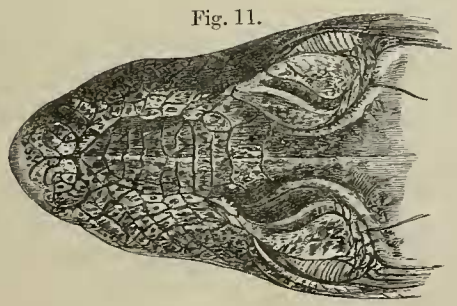


Fig. 13.

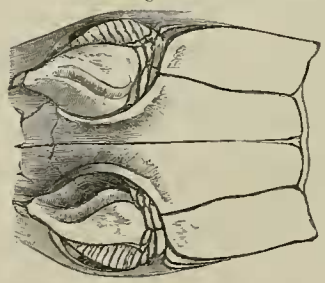
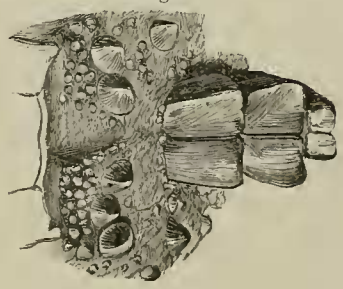


Fig. 12.

Fig. 14.



Figs. 11–14. Head and cervical and nuchal plates of young *Halcrosia nigra*

Black, slightly mottled with pale whitish. Head pale olive, black dotted; sides of lower jaw black-banded; muzzle broad, oblong, trigonal, rather dilated on the sides; forehead high, broad, and flat, with a small tubercle at the front angle of the orbit. Nuchal shields strongly keeled, two in a cross line in two groups. Cervical shields six, in three pairs, all close together, the two anterior pairs of equal size, large, strongly keeled, and bent in on the outer sides, the hinder pairs much smaller. The vertebral series of dorsal shield broad, square, scarcely keeled, with one, and in the front of the back two rows of oval, elongated, keeled shields on the side of them, and a few isolated, scattered, compressed, high, tubercular-like, small, ovate shields on the sides of the body. Shields of the upper arm oblong, trigonal, keeled, in six oblique cross series. The lines of the upper jaw sinuous, three-parted, the front with five, the second with seven, and the hinder with five teeth.

The largest specimen I have seen is in the Free Museum at Liverpool, which is nearly 5 feet long, but I have no doubt it grows larger. The muzzle of this specimen from the tip of the nose to the orbit is $3\frac{1}{2}$ inches, its width in front of the orbit $2\frac{1}{2}$ inches, and at the notch of the canine teeth $1\frac{1}{2}$ inch. The eyelid is obliquely divided from the front of the orbit to the back of the eye.

The Black African Crocodiles appear to be a common species on the west coast of Africa; for they are often brought to the Port of Liverpool by the palm-oil ships, and frequently in a living state; indeed I am informed there were some lately alive in the Society's Gardens in the Regent's Park.

Mr. Andrew Murray, at my recommendation, has described it in the 'Proceedings' of the Society as a new species of Crocodile under the name of *C. frontatus*; for at that instant it did not occur to me that it might be the Black Crocodile of Adanson, noticed as an *Alligator*. It is to be observed that, though they have specimens of this Crocodile in the Paris Museum in such abundance as to part with the skeleton of it as a duplicate, it is not included as *Alligator palpebrosus*, or under any name, in M. Auguste Duméril's List of the Reptiles of West Africa, printed in the last volume of the Archives du Muséum of Paris.

This Crocodile has very much the external appearance of the Caiman with bony eyelids, *Crocodilus palpebrosus*, Cuvier; and I think it very likely that Cuvier mistook a specimen of it in the Paris Museum, which Adanson had marked with his own hand "*Krokodile noir du Niger*," for a specimen of that species. (See Cuvier, Oss. Foss. iii. p. 41.) And it is still confounded with that species by the French naturalists; for there is a skeleton in the British Museum, lately sent from M. Braconier, of the French Museum, under the name of *Caiman à paupières osseuses*.

Adanson, in his 'Voyage to Senegal,' at p. 10, mentions the occurrence of Crocodiles, and at p. 73 a second kind of Crocodile, which is as large as the other, and distinguished by the black colour and by the jaws being much more elongated. It is more carnivorous, and said to be fond of human flesh.

Cuvier, in his Essay on the species of existing Crocodiles, first published in the 10th volume of the 'Annales du Muséum,' and reprinted in his 'Ossemens Fossiles' under the head of *Le Caiman à paupières osseuses* (*Crocodilus palpebrosus*, nob.), after dividing this species into two varieties, expressed a doubt if they were not inhabitants of different continents. He observes, "One of my individuals, which has been for many years in the Museum, has on it the half-effaced name of *Krokodile noir du Niger* in the hand-writing of Adanson,"—and proceeds thus:—

"This naturalist, in his 'Voyage,' speaks of two Crocodiles in the Senegal. M. de Beauvois adds that he saw at Guinea a *Crocodile* and a *Caiman*. It is therefore clear that there is a species with the form of a *Caiman* that inhabits Africa.

"There remains still an embarrassment. Adanson says his *Black Crocodile* has the muzzle longer than the *Green*, which is certainly the same as the *Crocodile of the Nile*; but we have a specimen ticketed by his own hand which has a much shorter muzzle than that from Egypt.

"Has Adanson made a mistake in writing this phrase? or has he erroneously ticketed the specimen? How are we to disentangle these errors?" &c., vol. v. p. 41.

Duméril and Bibron, in their 'Erpétologie Générale' (vol. iii. p. 75) adopt and repeat all that Cuvier has said, and still doubt if these two varieties may not be found, the one in America, and the other in Africa.

If Cuvier and his successors had examined the two specimens on which they founded the account of his second variety of *C. palpebrosus*, they would have found that they were not only distinct species, but also species belonging to two genera or subgenera. The one which had served as the model for Seba, and which Seba, with the usual inattention to true habitats at that period, said came from Ceylon, was a true *Alligator*, and a native of America; and the other, ticketed by Adanson as from the Niger, was really a Crocodile from Africa: so that the sarcastic observation which he made on travellers, and which may in some cases be true, in this instance was uncalled for, the traveller being in fact more accurate than the cabinet naturalist; and Adanson only made a slip of the pen in saying the beak was *longer* instead of *shorter* than the common Green Crocodile; and any one who compares the Black Crocodile of Africa with an American Caiman will not think that M. Beauvois was very much out when he called it a "Caiman."

Cuvier, in his Essay, when describing *Crocodilus biscutatus*, established on the *Gavial du Sénégal* of Adanson, again refers to the *Crocodile noir* of that author. He states that among the drawings of Adanson there is the figure of a *Crocodilus vulgaris*, named *Crocodile noir*, and a *Caiman à paupières osseuses*, inscribed the *Crocodile vert*. This must evidently have been an inadvertence, like the statement of the length of the nose; but, as Cuvier observed, this is pardonable, as Adanson most probably named these drawings after he had forgotten them, and had been studying other things, long after his voyage, which occupied some of the first years of his youth. (See Cuvier, Oss. Foss. iii. 53.)

A *Caiman*, in some of its characters, but which is nevertheless a true Crocodile, with the canines fitting into a notch, and not into a pit, in the upper jaw, is, there cannot be any doubt, the Crocodile that Adanson referred to; for it agrees with his description in colour and in its ferocious habits. And further that it is the Crocodile that the French naturalists refer to, is proved by the fact, already recorded, that we have received from one of the persons employed by M. Duméril at the Paris Museum a skeleton of a young specimen of the Black Crocodile of West Africa as the skeleton of the American *Alligator palpebrosus* of Cuvier.

** *Face very long, slender; nasal not reaching to the nostril.* Gavialian Crocodiles.

7. Mecistops.

Face subcylindrical, scarcely dilated in the middle; orbits simple. Nuchal shields numerous, small, in two cross series. Cervical disk narrow, containing two or three pairs of plates. Dorsal plates small, all keeled, in six longitudinal series, lateral one narrowest. Intermaxillary produced behind, and embracing the front end of the nasal.

Mecistops, Gray, Ann. & Mag. Nat. Hist. 3rd series, x. 273; Cat. Tortoises & Crocodiles B. M. 58. Huxley, Proc. Linn. Soc. iv. 15, 1859.

This genus has some resemblance to the Gavials; but the structure of the skull and the position of the teeth are those of a true Crocodile.

Professor Owen observes, "There is, however, a very close resemblance in the elongate, slender proportion of the skull and the elongated festooned border of the jaws between this species and the *Crocodilus schlegelii* from Borneo."—*Loc. cit.* p. 158. The *Crocodilus schlegelii* is a Gavial.

Dr. Falconer observes, "The nasal bones (in *Mecistops*) are extremely narrow and attenuated, but, as in the true Crocodiles, they descend between the maxillaries so as to project into a notch between the intermaxillaries. The same holds good in *C. schlegelii*, where, as with Gavials, the nasal terminates a short way in front of the orbits, and does not enter into the formation of the anterior portion of the beak" (p. 363). "This character is a good diagnostic mark between the Crocodile proper and the Gavials, separating *C. schlegelii* from the latter genus, under which Müller ranged it" (p. 363).

Dr. Balfour Baikie states, "In all essentials the skull of the *Mecistops* shows it is to be properly classed as a member of the family Crocodilidæ rather than the Gavialidæ. The teeth are irregular, the sides of the jaw are not parallel; there is a distinct swelling opposite the ninth remaining upper molar; and the lower canines are received into notches in the upper jaw."—*P. Z. S.* 1857, p. 58.

MECISTOPS CATAPHRACTUS. (African False Garial.) (Plate XXXII. figs. 1, 2, 3.)

Crocodilus biscutatus, Cuvier, Oss. Foss. iii. 52, 65, t. 5 (very young).

Crocodilus bisulcatus, Bory, Dict. Class. N. H. v. 108, misprint.

Crocodilus cataphractus, Cuvier, Oss. Foss. v. t. 5. f. 1, 2 (crocodile à nuque cuirassée); [copied A. Dum. Arch. du Mus. x. t. 14. f. 2]. Dum. & Bib. E. G. iii. 126 (young). Bennett, Proc. Zool. Soc. 1834, p. 110. Owen, Cat. Osteol. Spec. Mus. Coll. Surg. p. 155. n. 710 (Cuvier's type).

The Crocodile, Bowdich, Madeira, 232.

Crocodilus leptorhynchus, Bennett, Proc. Zool. Soc. 1835, p. 129. A. Dum. Arch. du Mus. x. 252 & i. 171, t. 14. f. 1.

Mecistops cataphractus, Gray, Cat. B. M. 58.

Mecistops bennettii, Gray, Cat. B. M. 57.

Gavial of Senegal, Gray, Rep. Brit. Assoc. 1862, Sect. 107.

Mecistops, Balfour Baikie, Proc. Zool. Soc. 1857, p. 58.

Hab. West and Central Africa; ? Fernando Po (*Bennett*), Gaboon, Lagos. Central Africa, River Binuë (*Baikie*).

The species has been described from small young specimens. It grows to a large size. There is an imperfect specimen which is scarcely adult, in the British Museum, that was sent from Fernando Po by Capt. R. F. Burton, which must have been 13 or 14 feet long. Unfortunately it wants the head; the body is 5 feet and the tail $8\frac{1}{2}$ feet long.

Fig. 15.

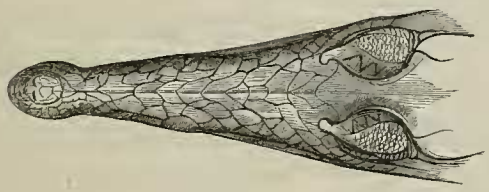


Fig. 17.

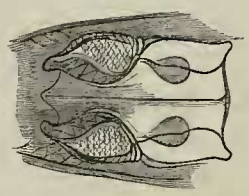


Fig. 16.

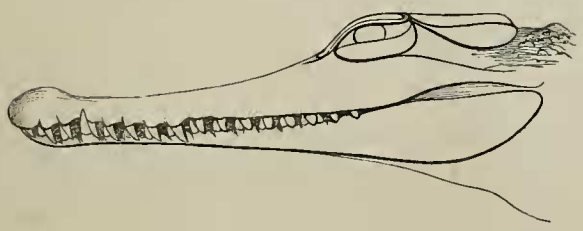


Fig. 18.

Figs. 15–18. Head and cervical shield of *Mecistops cataphractus*.

The specimen, originally sent by Mr. Bennett, was said to have come from Fernando Po; but Dr. Balfour Baikie observes that Fernando Po is a small volcanic island, totally without the muddy rivers delighted in by Crocodiles, and possessing nothing but streams, which during the rainy season are tumultuous mountain-torrents, with rocky beds.—*Proc. Zool. Soc.* 1857, p. 58.

Most probably Mr. Bennett's specimen came from the coast, and was only received through agents at Fernando Po.

Cuvier, in his Essay, described, under the name of *Crocodilus biscutatus*, and figured the nuchal shields at t. 2. f. 6, a species of Crocodile founded on a specimen in the French Museum, which is labelled in Adanson's hand "*Gavial du Sénégal*," and also on a very mutilated stuffed specimen which Cuvier found in the Museum of the Academy of Sciences at Paris (see *Oss. Foss.* v. 53, 65, t. 2. f. 6). He observes:—"the colour of these specimens is scarcely darker than that of the common Crocodile; therefore it cannot be the Black Crocodile of Adanson." And he further specially remarks that "the jaws are a little longer and narrower than those of *C. vulgaris*, but not so long and slender as those of *C. acutus*."

It resembles the latter in the dorsal shield of the vertebral line being only slightly keeled; but its peculiar character is that the middle of its nape is armed with two large pyramidal shields, and with two smaller ones in front of them.

This Crocodile has been a paradox until this time. MM. Duméril and Bibron regarded this mutilated specimen as only a specimen of the American Crocodile (*C. americanus*) with an anomalous development of the cervical and nuchal shields, observing that the specimens of this species are liable to variation in this respect; but yet they do not describe any as exactly resembling Cuvier's description or figure.

It does not appear that the specimen labelled by Adanson came under the examination of these naturalists; at least I cannot find any reference to it in their work. Cuvier unfortunately does not state its size; but I have a strong opinion that it must have been a very young specimen of *Mecistops cataphractus* before its elongated jaws were developed, and that the name of *Gavial du Sénégal* was very applicable to it; the back is grooved, by the flatness of the vertebral series of shields, as described by Cuvier, and as is characteristic of the American Crocodile (*C. acutus*) with which MM. Duméril and Bibron compared it. But this is a question that can only be solved by the examination of the original specimens.

Cuvier, in his Essay (vol. v. p. 58), observes, "When in England in 1818[1], I saw at the

[1] I recollect this visit with pleasure; for I was deputed by Dr. Leach to show this celebrated naturalist and wavering politician some of the natural-history treasures, and also some of the social and political peculiarities of the metropolis, such as the Tower, the Bell and Lancaster and other schools, &c. Among the rest, I took him to the Westminster election, at Covent Garden. Being known to Sir Francis Burdett, I took M. Cuvier on to the hustings, and introduced him to some of the Westminster notabilities, whom he knew by reputation, and was anxious to see in person. He was so interested in these bygone saturnalia that we lingered too long; for when Capt. Murray Maxwell attempted to speak, we were glad to "duck our heads" to avoid the cabbage-stumps, rotten eggs, and dead cats and dogs with which the Captain was assailed; and when the mob attempted to take the hustings by storm, and were only driven off by the men-of-war's men who were retained by Capt. Murray's committee, we found it difficult to retreat. Cuvier visited England again in 1830, during the short revolution which placed Louis Philippe on the throne. While here, the Zoologists invited him to a dinner at the Albion Tavern: he was greatly pleased with what he called the almost royal magnificence of the

Museum of the College of Surgeons a dried specimen of a Crocodile." This he describes and figures under the name of "*Crocodile à nuque cuirassée*" (*Crocodilus cataphractus*, nob.).

In 1834 Mr. Edward Turner Bennett (Proc. Zool. Soc. ii. p. 10) gave a notice of a specimen of *Crocodilus cataphractus* of Cuvier being alive in the gardens of this Society. At the meeting of the Society on the 22nd September, 1835 (Proc. Zool. Soc. iii. p. 129), after the animal had died, on more close examination, he described this animal as a new species, under the name of *Crocodilus leptorhynchus*; and Mr. Martin added some notes on its internal anatomy.

It is to be observed that Mr. Bennett and I were misled on this occasion by the erroneous breadth given to the animal in the figure published by Cuvier; for he speaks of the length of the head "being to its breadth as 3 to 1," instead of as $2\frac{1}{2}$ to 1.

In my Catalogue of the Tortoises, Crocodiles, and Amphibians in the Collection of the British Museum, published in 1844, I formed a genus under the name *Mecistops* for this animal, and for the first time described a full-grown specimen of it which we had received from the Gambia as *M. bennetti*; for Mr. Rendal considered it distinct from Cuvier's animal, but observed that they might be varieties.

This might all have been avoided if we could have seen the original specimen; but when I inquired for it, it could not be found.

The specimen described and figured by Cuvier is fortunately now to be seen in the Museum of the College of Surgeons, referred to under No. 710 in the Catalogue of Osteological Specimens of that collection. It is a young dried specimen of the Crocodile which is now so frequently brought from the west coast of Africa, and it affords no ground for the supposition of M. Duméril, expressed in his paper "On the Reptiles of Western Africa" (Arch. du Mus. v. 252), that these may be distinct species; and it shows that the figure of Cuvier, though characteristic, is not very carefully drawn, and that any difference that may appear results from the want of accuracy in the figure, and is not to be found in the animal itself,—supporting the opinion that I expressed in my paper in the 'Annals and Magazine of Natural History,' 3rd series, x. p. 274.

M. Auguste Duméril, in his paper "On the Reptiles of Western Africa" (Archiv. du Mus. x. 271), gives a good figure of a half-grown specimen of this species under the name of *Crocodilus leptorhynchus*, t. 14, and places by the side of it a tracing of Cuvier's figure of *Crocodilus cataphractus*, to show that they cannot be alike; but the

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entertainment. During the dinner the news arrived that the Orleans party had succeeded; he and his step-daughter, Miss Duvaucel (who was in the gallery with some ladies), immediately displayed the national colours. Cuvier's political predilections were not strong; for he had held office under Napoleon and under the Bourbons, and he made no secret that he came provided so as to acknowledge the success of either party: he had a white and a tricolour cockade *in* his hat ready to show as the occasion required. When I visited him in after times, he more than once referred to the events of his visits.

comparison of the specimens on which these species were founded shows how much better it is to refer to nature than to depend on figures and descriptions, which are liable to the imperfection attending human observation and record.

Dr. Falconer, in the 'Annals and Magazine of Natural History' for 1846 (xviii. 362, t. 6), described and figured a skull of this species under Cuvier's name, which was in the Belfast Museum, and said to have been sent from Sierra Leone.

Dr. Balfour Baikie described the skull of a specimen from the River Binuë (see Proc. Zool. Soc. 1857, p. 58).

Family III. ALLIGATORIDÆ.

The upper and eleventh lower teeth longer, like canines, the canines of the lower jaw fitting into holes or perforations on the edge of the upper jaw.

Alligatoridæ, Gray, Cat. Tortoises &c. B. M. 56, 1844. Huxley, Journ. Proc. Linn. Soc. iv. 3.
Alligator, Cuvier. Gray, Ann. Phil. x. 195.

Teeth strong, unequal; the hinder ones differ in shape from the anterior. The front pair of mandibular teeth, and the fourth pair (canines) are received into pits on the edges of the præmaxilla and maxillæ. The mandibular teeth behind these pass inside and not between the maxillary teeth. The premaxillo-maxillary suture on the palate is straight or convex forwards. The symphysis of the lower jaw is short.

Spix, in his work on Brazilian Lizards, gives very good figures of the Alligators, with the colours well marked. The Memoir on South-American Alligators by Natterer, contains very accurate and detailed figures of the head and the neck-shield of the different species. He has figured some varieties or species very nearly allied to those here noticed, which have not come under my observation.

Spix divided the Alligators into two genera:—*Jacaretinga*, with acute nose (1. *J. moschifer*, t. 1 = *Caiman palpebrosus*, p. 161; 2. *J. punctulatus*, t. 2 = *Jacare punctulata*, p. 159); and *Caiman*, or *Jacare*, with blunt nose (including 1. *C. niger*, t. 4 = *Jacare nigra*, p. 167; 2. *C. fissipes* = *Jacare latirostris*, p. 167).

His figures are very good representations of the species—indeed, the best known.

MM. Duméril and Bibron admit the three species described and figured by Spix, thus:—

1. *A. sclerops*, p. 74; *Caiman noir*, Spix, Bras. t. 4. Head elongate, flattened, a ridge in front of each eye, the upper eyelid *finely* striated. *Nape with two rows of small oval compressed scales.* Back with two central longitudinal ridges, the three last cross bands of six keeled scales. Black, yellow-banded. I have no specimen agreeing with the account of the nuchal scales and the eyelid of *A. sclerops*: according to Spix the dorsal scales are elongate.

2. *A. cynocephalus*, p. 86, *Caiman fissipes*, Spix, Bras. t. 3. Head short, broad, thick, a ridge in front of each eye, the upper eyelid rugose. *Nape with two rows of*

large square keeled shields. Back scale keeled, the three last *cross bands of four scales* Sides with some strong keeled scales. Back green, black-dotted.

3. *A. punctulatus*, p. 91, Spix, Bras. t. 2. Head elongate, nose flattened, with a rounded point in front, *without any preocular ridges*, upper eyelid rugose. Nape with two rows of shields. Back flat, scarcely keeled. Sides with some larger scales. Yellow, black-dotted.

John Natterer, in his "Beitrag zu den Süd-Amerikanischen Alligatoren," edited by Fitzinger, describes eight species of the genus *Champsa*: five have partly bony eyelids, and three have them entirely bony. The five former belong to the genus under consideration.

The preorbital ridge distinct, beak broad with three lateral foveolæ, eyelid striated, beak broad and blunt. *C. nigra*, t. 21.

The nuchal scutella many, in three series. *C. fissipes*, t. 22.

The nuchal scutella many, in two series. *C. sclerops*, t. 23.

The preorbital ridge evanescent, beak without lateral foveolæ, eyelids rugose. The frontal ridge flexuous, bent in front. *C. vallifrons*, t. 24.

The frontal ridge arched, bent back. *C. punctulata*, t. 25.

M. Natterer gives the following proportional measurements of the heads:—

	Length of Head.		Width of Head.		Length of Crown before.		Width of Crown before.		Width of Beak above the eighth tooth.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
Champsa nigra	16	0	8	0	3	6	4	9	5	1
——— fissipes	10	3	6	5	2	7	3	5	4	0
——— sclerops	6	6	5	8	2	8	3	3	3	3
——— vallifrons	7	10	4	6	2	0	2	9	2	3
——— punctulata	10	5	5	4	2	5	3	2	2	5

The figures of the heads of the last two species differ from that of *C. sclerops* chiefly in the nose being narrower (*C. punctulata* being the narrowest and very slender), narrower than in any specimens that have come under my observation; the lower jaws in the figure also differ in shape, that of *C. vallifrons* being the most slender. Dr. Strauch, who had M. Natterer's specimens to examine, regards the two latter as the same species, but distinct from *sclerops*.

Synopsis of Genera.

I. *The ventral scutella like the dorsal ones, bony and articulated together, forming a shield. The eyelids with an internal bony plate. The cervical scutella in pairs, forming an elongated shield. Nasal bone short.* Tropical America.

1. Jacare. The orbits united by a bony cross ridge. Eyelids partly striated or rugose.
2. Caiman. The orbits not united by a cross ridge. Eyelids bony, entirely smooth.

II. *The ventral scutella thin, the dorsal scutella bony, not articulated together. The eyelids fleshy, smooth. The cervical scutella in pairs, separate. Nasal bone elongate, separating the nostrils.* North America.

3. Alligator. The face broad, depressed.

Section I. *The ventral scutella like the dorsal ones, bony and articulated together, forming a shield. The eyelids with an internal bony plate. The cervical scutella in pairs, forming an elongated shield. Nasal bone short.* Tropical America.

1. Jacaré.

Head moderately high, shelving on the sides. Orbits united by a distinct bony cross ridge. Eyelids striated or rugose, strengthened by a small internal bone. The cervical scutella four or five pairs, forming a shield; the dorsal and ventral scutella both consolidated together, forming a dorsal and ventral shield; the gular and ventral scutella smooth.

Jacare, Gray, Cat. Tort. Croc. &c. B.M. 64, 1844; Ann. & Mag. N. H. 3rd series, x. 327, 1862. Huxley, Proc. Linn. Soc. 1859, 4.
Jacaretinga, Spix, Lacert.

The pits in the maxilla are the cavities left by the preorbital ridges as they advance. The intermaxillary bone short, truncated behind, with an elongate-oval or lanceolate cavity between this and the front of the palate.

The figures of Natterer are excellent to general appearance, but they do not agree with the measurements of our specimen; that is to say, the nose of *Champsa fissipes*, from the ridge, is about the same length as the forehead, but in his figure it is represented as larger, and it is so in all the other figures: perhaps this is to allow for the perspective.

A. *Head elongate; interorbital ridges strong. Dorsal scutella elongate, keeled, keels of vertebral series highest; lumbar scutella in six longitudinal series. Nuchal scutella small, compressed. Eyelids striated, with a rather large internal bone. Back black varied with yellow.* Melanosuchus, *Gray, Ann. & Mag. N. H.* x. 328.

1. Jacare nigra. (Black Jacare.)

Crocodilus sclerops, Schn. Amph. 162. Blainv. Ostéogr. Crocod. t. 3. f. 2, t. 4. f. 13.
Crocodilus yakare, Daud.
Alligator sclerops, Cuvier, Oss. Foss. v. 35, t. 1. f. 6 & 7, t. 2. f. 3. Brühl, Skelet. Krokod. t. 12. f. 3, 5, 6, 7, t. 19. f. 21.
Alligator sclerops, var., Gray, Syn. Rept.
Caiman niger, Spix, Bras. t. 4 (good).
Champsa nigra, Natterer, Beitr. t. 21 (good).

Alligator niger, Owen, Cat. Osteol. Spec. Mus. Coll. Surg. p. 704. n. 166 (adult).
Jacare nigra, Gray, Cat. Tort. & Croc. 65; Ann. & Mag. N. H. x. 328, 1862.

Hab. Para, 13 feet long (*Graham*); Guiana (*Owen*).

I think it better to adopt Spix's name, as *sclerops* has been used for all the species.

B. *Head short; orbits with diverging ribs in front to edge of jaw. Dorsal scutella broad, slightly keeled, equal; the lumbar scutella in four longitudinal series. Nuchal scutella distinct, in two cross series. Eyelids rugose, with a small internal bone. Back olive, banded with brown.* Cynosuchus, *Gray, Ann. & Mag. N. H.* x. 328.

In many of the specimens the first scale of the nuchal shield has two keels, in others it has only one; but in several specimens the scale has two keels on one side and only one on the other.

a. *Head short, broad, depressed, with very distinct preorbital ridges to the edge of the jaw. Cervical disk short, broad, formed of four bands of scutella. Sides of jaws pale, with a series of dark spots.*

2. Jacare latirostris. (Dog-headed Jacaré.)

Dorsal shields in eight longitudinal series, four on each side. Ventral shields in twelve series.

Crocodilus latirostris and *C. yacare*, Daud. Rept. ii. 407, 417.
Caiman fissipes, Spix, Bras. t. 3 (good).
Champsa fissipes, Wagner, Icon. t. 17. Natterer, Beitr. t. 22 (good).
Crocodilus sclerops, Wied. Abbild. t. Blainv. Ostéogr. Crocod. t. 3. f. 2, t. 4. f. 13. Schinz, Rept. t. 112.
Jacare fissipes, Gray, Cat. Tortoises B. M. 64.
Alligator sclerops, Pr. Max. Abbild. t.
Alligator cynocephalus, Dum. & Bib. Erp. Gén. ii. 86.
Jacare latirostris, Gray, Ann. & Mag. N. H. x. 328.

Hab. Brazils; Pernambuco (*J. P. G. Smith*); Surinam.

The nose of the young specimen is as long as the width at the eighth tooth. The nose from the ridges nearly as long as the back of the head; width of the muzzle at the notch one-half the length of the head.

Var. 1 (three young, in spirit). Head short; side of face pale, with a dark spot under each ear, and another larger under each eye. The lower jaw pale, five round spots on each side, the middle one, under the eyes, the largest. Back black, with interrupted or irregular pale brown cross bars.

Hab. Pernambuco (*J. P. G. Smith*).

The smaller specimen is peculiar for the very small size of the ventral shield in front

of the vent. The spots on the side of the face and lower jaw are to be seen in the older specimens when they are between 3 and 4 feet long.

Var. 2. Head rather larger and narrower. The nose from the ridge rather longer than the back of the head; width of the notch two-fifths the length of the head. Cheek and side of the lower jaw with five large black spots. Ventral shields in twelve series. Dorsal shields four.

Hab. South America; Lake of Santa Cruz de la Sierra.

3. Jacare multiscutata. (Brazilian Jacaré.)

With sixteen series of ventral shields; hinder ventral shields very narrow. Dorsal shields in ten longitudinal series, five on each side.

Hab. Brazil.

A skin in the British Museum (46. 7. 10. 41).

b. *Head elongate, longer than the width at the eighth tooth, with none or only indistinct evanescent ridges from the front of the orbit. Cervical disk oblong, elongate, of five series of scutella.*

* *Face depressed, broad; sides of the jaws with a series of large coloured spots.*

4. Jacare longiscutata. (Long-shielded Jacaré.) (Plate XXXIV.)

Dorsal scutella elongate, longer than broad, uniformly keeled, in ten longitudinal series on the middle of the body; ventral scutella elongate, in fourteen or sixteen longitudinal series. Sides of the jaws pale, with five or six band-like spots; the inner pairs of the first and second series of cervical scutella large and equal-sized.

Jacare longiscutata, Gray, Ann. & Mag. N. H. x. 328, 1862.

Hab. South America. Brit. Mus.

This is very like the following; but the head is rather broader, and the dorsal and ventral shields are much larger, and more numerous.

It is known from the young of *Jacare nigra* by its olive colour, the spots on the sides of the jaws, and the presence of the distinct nuchal scutella.

5. Jacare ocellata. (Eyed Jacaré.) (Plate XXXIII.)

Dorsal scutella broad, uniformly keeled, in eight longitudinal series in the middle of the body; ventral scutella in twelve longitudinal series, the hinder ones smaller, longer, and more numerous; the central pair of cervical scutella in the first series smaller than those that follow.

Jacare ocellata, Gray, Ann. & Mag. N. H. x. 329, 1862.

Hab. Lake of Santa Cruz de la Sierra. British Museum.

** *Face attenuated, rather high on the sides; sides of the jaws one-coloured.*

6. Jacare punctulata. (Dotted-jawed Jacaré.)

Back yellow, banded with brown; the sides of the head yellow; upper and lower jaws yellow, one-coloured, or minutely speckled; sides of the neck smooth, with flat scales. Nose rather high and square.

Jacare sclerops, Gray, Cat. Tortoises B. M. 64.
Crocodilus sclerops, Schn. Amph. 162. Cuvier, Ann. Mus., & Oss. Foss. v. t. 1. f. 6 & 7, t. 2. f. 3. Tiedem. Amph. 60, t. 5. Guérin, Icon. t. 2. f. 2 & 10. Gray, Syn. Rept. 62. Dum. & Bib. Erp. Gén. iii. 79.
Crocodilus americanus, Laur. from Seba, t. 104. f. 10.
Crocodilus caiman, Daud. Rept. iii. 394.
Caiman (*Jacaretinga*) *punctulatus*, Spix, Bras. t. 2 (good).
Champsa sclerops, Wagner, Syst. t. 7. f. 1, 2, and f. 42. Natterer, Beitr. t. 22 (heads good).
Alligator punctulatus, Dum. & Bibr. Erp. Gén. ii. 91.
Jacare punctulata, Gray, Ann. & Mag. Nat. Hist. x. 329, 1862.

Hab. Brazil (*Spix*); Surinam; Argentine Republic (*H. Christy*).

Natterer figures two other species, under the name of *Champsa vallifrons* (t. 24), (*Jacare vallifrons*, Gray, Cat. B. M. 65), and *Ch. punctulata* (t. 25) (*Jacare punctulata*, Gray, Cat. B. M. 65), which seem to differ from the former in the head being narrower and more tapering. I have seen no specimens agreeing with these figures; but they look very like varieties of the above. At the same time, some of our specimens appear to have a more attenuated snout than others; but when you apply the callipers to the nose and to other parts of the head, the absolute proportions of the parts are very nearly the same.

A stuffed specimen from the Argentine Republic measures 6 feet 9 inches long, the head from the occiput is $10\frac{1}{2}$, and the nose from the ridge $6\frac{1}{2}$ inches. In another, from the Zoological Society's Gardens, 5 feet 10 inches long, the head from the occiput is 10 inches, the nose from the ridge $6\frac{1}{2}$ inches long. A series of young specimens in spirits are pale brown, the back and tail with narrow brown cross bands, those on the back sometimes broken into square spots; the cheek and outside of the lower jaw pale yellow, without spots. The sides of the nuchal disk dark-coloured.

7. Jacare hirticollis. (Rough-necked Jacaré.)

The scales on the sides of the neck rough, spinulose, pale yellow; back and tail brown, cross barred; cheek and sides of the lower jaw yellow, not spotted.

Hab. Demerara. B. M.

I may observe that, characteristic as are the figures of Dr. Natterer's paper, none of them exactly agrees in measurements with the specimens in the British Museum.

In some specimens of the *Jacare* the first and, sometimes, even the second cervical

scutella have two keels, in others only one; but this is no specific distinction; it is not rare to find species with two keels on one side of the neck, and only one on the other.

2. Caiman.

Head high, flattened on the sides, angulated above. Orbits without any ridges. The eyelids smooth, strengthened with a large, single, internal bony plate. The dorsal and ventral scutella bony, articulated together, forming a dorsal and ventral shield; the gular and lateral ventral plates keeled, the abdominal ones smooth; the cervical scutella four or five pairs, with sometimes one or a pair interposed between the second and third pairs.

Skull with the superior temporal fossæ obliterated, the circumjacent bones uniting, the eyelid with a single large bony plate covering the whole upper surface. Vomer not apparent on the palate.

Caiman, Gray, Cat. Tortoises &c. Brit. Mus. 66, 1844; Ann. & Mag. Nat. Hist. 3rd series, x. 330. Huxley, Proc. Linn. Soc. iv. 3.

This genus has been divided into two species—one having the cervical shields two, and the other four in a cross series; in all the latter there are two in a cross series, with one or two interpolated between the shields.

I have seen no specimen which agrees in the the nuchal shields with either of the figures in Cuvier, Oss. Foss., though our two species agree in other respects with his figures; and how such species with distinct organic characters could be regarded as varieties, I am unable to learn.

I cannot conceive what induced M. Cuvier in his 'Essay' to consider the two South-American Alligators with bony eyelids varieties; for he justly observes, "The Crocodile of St. Domingo is not more distinct from the Crocodile of the Nile than these two varieties are from each other." In the Latin synopsis of the species, which is appended to the paper, they are regarded as distinct, and the second one is called *C. trigonatus*. Yet MM. Duméril & Bibron, in their work, persist in following Cuvier's first idea of their being only varieties, and in regarding Adanson's specimens as belonging to the second variety, and also in doubting if the "two varieties," are both from America.

The specimen in the British Museum proves most distinctly that there are two very distinct Alligators with bony eyelids found in Tropical America; which agrees well with the character that M. Cuvier and MM. Duméril & Bibron give to the two varieties of that species; and these species are, as Cuvier observes, as distinct from one another as *C. americanus* from *C. vulgaris*. The heads of both these species are figured by Dr. John Natterer in his "Essay on American Alligators" in the Vienna 'Transactions.' This author also figured a third species, which he calls *A. gibbiceps*, which, if it is separable from *A. trigonatus*, must be distinguishable from it by very slight characters.

The *Black Crocodile* (*Halerosia palpebrosa*) of West Africa has so much resemblance

to this animal that Cuvier considered Adanson's West-African specimen a variety of this species.

Duméril & Bibron evidently considered the African and the American animals the same species; and we a short time ago received from M. Braconier, of the Jardin des Plantes, a skeleton of the African species under the name of *Alligator palpebrosus*, var.

A. *Head shelving on the sides. Nuchal scutella in a single cross series, cervical scutella five pairs; dorsal scutella highly keeled, irregular, in six series; the lumbar scutella in two longitudinal series; the gular and two outer lateral series of ventral scutella keeled. The flat upper disk at the base of tail broad and strongly crested.* Paleosuchus, *Gray, Ann. & Mag. N. H.* x. 330.

1. Caiman trigonatus. (Rough-backed Alligator.)

Crocodilus trigonatus, Schn. Amph. 161. 6. Tiedemann, Amph. 66, t. 67.
Crocodilus palpebrosus, var. 2, Cuvier, Oss. Foss. v. 40, t. 2. f. 1.
Caiman trigonatus, Gray, Cat. Tortoises &c. B. M. 66; Ann. & Mag. N. H. x. 330, 1862.
Alligator palpebrosus, Brühl, Skel. Krok. t. 19. f. 3.
Champsa trigonata, Natterer, Beitr. t. 26 (good).

Hab. Tropical America.

The largest specimen in the British Museum is rather above 4 feet long. The young specimens have the lateral ventral shields keeled.

B. *Head flat, and erect on the sides. Nuchal scutella many, in two cross series; cervical scutella three pairs; dorsal scutella slightly keeled; the lumbar scutella in four longitudinal series; the gular, the ventral, and the lateral abdominal scutella keeled. The flat upper disk at the base of the tail elongate.* Aromosuchus, *Gray, Ann. & Mag. N. H.* x. 330.

2. Caiman palpebrosus. (Banded Alligator.)

Brown; tail black-banded.

Crocodilus palpebrosus, var., Cuvier, Oss. Foss. v. t. 1. f. 6–17 and t. 2. f. 2.
Champsa palpebrosa, Natterer, Beitr. t. 27 (good).
Caiman (*Jacaretinga*) *moschifer*, Spix, Bras. t. 1 (skull).
Caiman palpebrosus, Gray, Cat. Tortoises &c. B. M. 67; Ann. & Mag. Nat. Hist. x. 330, 1862.
Crocodilus palpebrosus, Tiedem. Nat. Amph. t. 6.
Alligator palpebrosus, Merrem, Syst. 35. Gray's Syn. Rept. 63.

Hab. Tropical America.

Natterer figures the head of a species under the name of *C. gibbiceps*; but I do not see how it differs from the above, except that the head is a little higher—perhaps a sexual distinction. Dr. Strauch regards *C. gibbiceps* as the same as *C. palpebrosus*.

Section II. *The ventral scutella thin, the dorsal scutella bony, not articulated together. The eyelids fleshy, smooth. The cervical scutella in pairs, separate. Nasal bone elongate, separating the nostrils.* North America.

3. Alligator.

Head depressed, broad, without any ridges in front of the orbit. Snout very broad, flattened and rounded at the end; the ninth maxillary tooth the largest. The eyelids smooth, fleshy. The dorsal scutella not articulated together, in six longitudinal series; the ventral scutella thin; the gular and abdominal shields smooth; nuchal scutella one pair, small; cervical scutella three pairs, hinder smallest. Nostril separated by a bony septum. The feet webbed. Dorsal plates in six longitudinal series, the two vertebral closer together. The sides with a short series close to the others, sometimes reduced to only one or two shields.

Alligator, Gray, Cat. Tort. B. M. 66; Ann. Mag. N. H. x. 330, 1862. Huxley, Proc. Linn. Soc. iv. 3.
Champsa, Wagler, Syst. d. Amph. 140.

Alligator mississippensis. (Alligator.)

Alligator, Catesby, Carol. t. 63.
Crocodilus mississippensis, Daud. Rept. ii. 412.
Crocodilus lucius, Cuvier, Ann. Mus. x., and Oss. Foss. v. t. 1. f. 8; t. 2. f. 4. Tiedem. Amph. 58, t. 4. Merrem, Zool. 34. Owen, Cat. Osteol. Spec. in Coll. Surg. p. 165. n. 760, 761. Blainv. Ostéog. Crocod. t. 2. f. 1, t. 5. f. 1. Brühl, Skelet. Krokod. t. 8. f. 5, 6, t. 9. f. 3, t. 10. f. 3, 4, t. 11. f. 2, 3, t. 20. f.
Alligator mississippensis, Gray, Cat. Tortoises B. M. 66; Ann. & Mag. Nat. Hist. x. 331, 1862.
Crocodilus cuvieri, Leach, Zool. Misc. ii. 117, t. 102.
Alligator lucius, Merrem, Tent. 34. Dum. & Bibr. Erp. Gén. iii. 75, t. 25, 26.
Alligator cuvieri, Bory de St. Vincent, D. C. H. N. v. 104.

Hab. North America, New Orleans, Texas.

Var. 1. The nose very broad and short. The largest specimen of this variety in the British Museum is nearly 4 feet long.

Var. 2. The nose narrower and longer. The largest specimen in the British Museum is of the same size as the former, which is nearly 4 feet long. Are they the two sexes?

The young specimens in spirits have the back black, with narrow white cross bands. The head pale brown, black-varied. Ventral shields in eight or ten longitudinal rather irregular series.

There is a very young specimen of this species in spirits, from New Orleans, in the British Museum. It is black, with white cross bands. The beak is short, rather slender, with a ridge of skin in front of each eye, giving the appearance of a frontal ridge.

EXPLANATION OF THE PLATES.

PLATE XXXI.

Figs. 1, 2, 3. Skull of *Bombifrons indicus*. Adult.
Figs. 4, 5, 6. Skull of *Halcrosia nigra*. Half-grown*.

PLATE XXXII.

Figs. 1, 2, 3. Skull of *Mecistops cataphractus*. Adult. Length 21 inches.
Figs. 4, 5, 6. Skull of *Molinia intermedia*. Adult. Length 30 inches†.

PLATE XXXIII.

Jacare ocellata. Young: stuffed. Natural size.

PLATE XXXIV.

Jacare longiscutata. Young: stuffed. Natural size.

* Called on the Plate "*Halcrosia frontata*."

† Called on the Plate "*Crocodilus intermedius*."